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Aerospace Medicine and Biology
A Continuing Bibliography with Indexes

NASA SP-7011(231)
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National Aeronautics and Space Administration

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ACCESSION NUMBER RANGES

Accession numbers cited in this Supplement fall within the following ranges.

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NASA SP-7011(231)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 231)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in March 1982 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA).*

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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* lists 284 reports, articles and other documents announced during March 1982 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA).* The first issue of the bibliography was published in July 1964.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the Earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections: *IAA Entries* and *STAR Entries*, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

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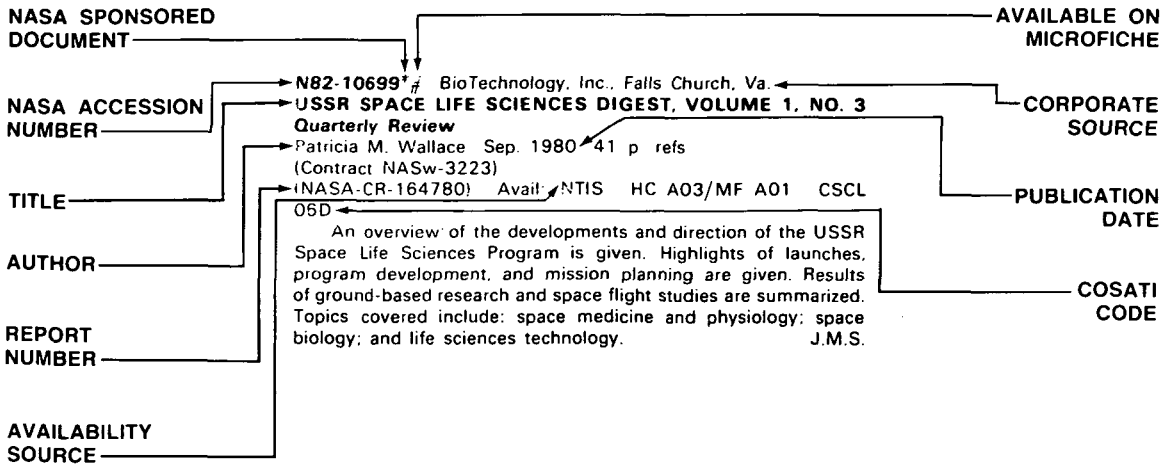

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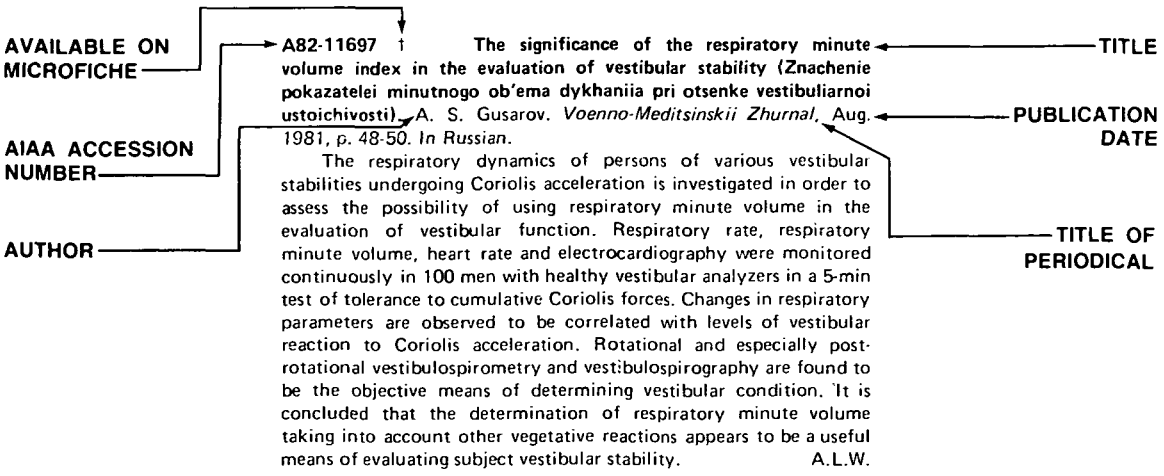

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 231)

APRIL 1982

IAA ENTRIES

A82-16125 **Disappearance of stabilized chromatic gratings.** D. H. Kelly (SRI International, Menlo Park, CA). *Science*, vol. 214, Dec. 11, 1981, p. 1257, 1258. 9 refs. Grant No. NIH-EY-01128.

When the image of a stationary, sinusoidal luminance grating is stabilized on the retina of a human subject, he becomes unable to detect this stimulus at contrasts that are readily visible in normal, unstabilized vision. At much higher contrasts, such stabilized gratings can still be seen over most of the normal range of spatial frequencies, although the threshold contrast may be increased by as much as 20 or 30 times. When the analogous experiment is performed with an isoluminance chromatic grating, however, there is no contrast that can restore the visibility of the stabilized grating; the threshold elevations for stabilized chromatic gratings are too great to measure. Saturation red/green gratings fade out and disappear at 100% contrast (even where this is 45 times the unstabilized threshold), and they do not reappear as long as stabilization is maintained. Without some kind of temporal variation of the proximal stimulus, the opponent-color pathways apparently do not respond to spatial patterns. *(Author)*

A82-16167 **Computer-enhanced thallium scintigrams in asymptomatic men with abnormal exercise tests.** G. S. Uhl, T. N. Kay, and J. R. Hickman, Jr. (USAF, School of Aerospace Medicine, Brooks AFB, TX). *American Journal of Cardiology*, vol. 48, Dec. 1981, p. 1037-1043. 37 refs.

The usefulness of computer-enhanced thallium-201 myocardial perfusion scintigraphy in excluding the diagnosis of coronary artery disease in asymptomatic patients showing abnormal exercise electrocardiograms is evaluated. Multigated thallium scans were obtained immediately following and 3 or 4 hours after maximal exercise testing in 191 consecutive asymptomatic Air Force aircrew members who had shown abnormal exercise electrocardiograms and who were due to undergo coronary angiography. Computer enhancement of the raw images is found to lead to four false positive and two false negative scintigrams as revealed by angiographic results, while the group of 15 with subcritical coronary disease exhibited equivocal results. Results reveal that enhanced thallium scintigrams are an accurate diagnostics tool in detecting myocardial ischemia in asymptomatic patients and may be used in counseling asymptomatic patients on their likelihood of having coronary artery disease. A.L.W.

A82-16274 † **Changes in blood indicators upon the inclusion of trace elements in the diet (Izmenenie pokazatelei krovi pri vkliuchenii v ratsion pitaniia mikroelementov).** V. Ia. Rusin, V. V. Nasolodin, and V. A. Suvorov. *Voenno-Meditsinskii Zhurnal*, Oct. 1981, p. 44-46. 8 refs. In Russian.

Results are presented of two series of experiments aimed at assessing seasonal changes in human work capacity and blood factors and the effects of trace element dietary supplements on these factors. Measurements of work capacity, body vitamin C content, metallic enzyme activity, serum protein spectra and immune and hematopoetic conditions were made at various times of the year in healthy young subjects, and in the spring in a second group of subjects receiving supplemental iron, copper, and manganese in combination with ascorbic acid and the pharmacological agent dibazol, which acts to stimulate the body's defenses. Vitamin C supplies and levels of proteins, albumins, alpha-globulins, lysozyme and serum complement are found to be significantly higher in the autumn-winter period than in the spring and summer, while concentrations of beta- and gamma-globulins increase in the summer. Physical work capacity and metallic enzyme activities are observed to depend more on individual motor activity than on the time of year. The combination of the mineral complex with vitamin C and dibazol supplements is shown to lead to greater increases in hemoglobin concentration, erythrocyte numbers, peroxidase and ceruloplasmin activities, vitamin C supplies, physical work capacity, alpha- and beta-globulin contents and serum lysozyme titers than vitamin C supplements alone, and is thus recommended for improving physical capacities. A.L.W.

A82-16275 † **Functional characteristics of the pilot hypothalamus-hypophysis-adrenal cortex system (Osobennosti funktsionirovaniia u letchikov sistemy gipotalamus-gipofiz-kora nadpochechnikov).** A. A. Novitskii, N. F. Markizova, and A. Iu. Kulidzhanov. *Voenno-Meditsinskii Zhurnal*, Oct. 1981, p. 50-53. In Russian.

Results are presented of an extended study of the functional characteristics of the hypothalamus-hypophysis-adrenal cortex (HHAC) system in flight personnel in the interflight period. System activities were determined by measurements of blood plasma levels of ACTH and 11-oxycorticosteroid and urinary levels of 17-oxycorticosteroid, 17-ketosteroid and dehydroepiandrosteroid in pilots having not flown for at least two weeks prior to the investigation. These indicators reveal that HHAC activity is elevated in pilots with respect to age-matched controls. Significant differences between HHAC system activity were not found between the various age groups, however. The intramuscular injection of 40 units of ACTH is found to lead to sizeable increases in the levels of 17-oxycorticosteroids and 17-ketosteroids excreted by the control subjects, however not in the pilots, indicating the depletion of physiological reserves in the pilot adrenal cortex. Greater levels of ACTH activity are found in pilots in the early stages of the profession, and in flight commanders. It is suggested that the HHAC systems of pilots function under a greater degree of stress than those of persons not involved in flight activities. A.L.W.

A82-16288 † **Determination of the angular orientation of the body of a walking machine (Ob opredelenii uglovoi orientatsii korpusa shagaiushchego apparata).** V. B. Larin and K. I. Naumenko (Akademiia Nauk Ukrainskoi SSR, Institut Matematiki, Kiev, Ukrainian SSR). *Matematicheskaia Fizika*, no. 30, 1981, p. 18-24. 7 refs. In Russian.

A nonlinear algorithm for estimating the Rodrigues-Hamilton parameters for the body of a walking machine is developed. The algorithm relies on measurements of the angular velocity vector of the body of the machine and of the vertical vector in a moving coordinate system. The algorithm is based on the least squares method and is orientated towards implementation on a digital computer. B.J.

A82-16701 **Astronaut activity in flight and enhancement of its efficiency (Deiatel'nost' kosmonavta v polete i povyshenie ee effektivnosti).** Edited by G. T. Beregovoi and L. S. Khachatur'iants. Moscow, Izdatel'stvo Mashinostroenie, 1981. 264 p. In Russian.

The general problems of manned space flight, the interaction of the astronaut and the spacecraft control systems, technical servicing and extravehicular activity, and the influence of flight factors on astronaut performance are among the topics discussed. Particular attention is given to current problems of the psychophysiology of astronaut work, the statistical characteristics of astronaut operator activity directed at spacecraft control, simulation of operator activity in the technical servicing of a space station, and the influence of emotional stress on astronaut activity. B.J.

A82-16702 † Basic principles and methods for assuring the efficiency of astronaut activity in flight (Osnovnye printsipy i metody obespecheniia effektivnosti deiatel'nosti kosmonavta v polete). G. T. Beregovoi. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 6-13. In Russian.

A human-factors approach is taken to the evaluation of in-flight astronaut performance. Data characterizing the deterioration of astronaut performance at various stages of flight are presented, and various ways to compensate for this deterioration are discussed. The integration of the astronaut into various spacecraft control systems is considered. B.J.

A82-16703 † Current problems in the psychophysiology of space work /status and future prospects/ (Aktual'nye problemy psikhofiziologii kosmicheskogo truda /sostoianie i prognoz/). L. S. Khachatur'iants. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 13-25. In Russian.

Various problems in the psychophysiology of astronaut work are considered, including problems involving the dynamics and level of analyzer system functions in the course of space flight, and the investigation of the psychophysiological phases of flight. These problems are discussed with reference to astronaut selection and training, ascent, descent, and landing phases, and orbital and interplanetary flight. Possible future trends in the psychophysiology of astronaut work are also discussed. B.J.

A82-16704 † Concerning a model of human activity (O modeli deiatel'nosti cheloveka). G. M. Kolesnikov. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 25-46. In Russian.

A general functional-structural model of human activity is developed. From the functional point of view, the model incorporates the following subsystems: the subsystem of reflection of and action upon the external medium; the subsystem of the reflection of the internal medium on the basis of information about the external medium; and the subsystem of energy supply, and creation and conservation of structure. Human activity is always connected with the simultaneous functioning of all the subsystems under a definite domination of one of them at each stage of activity. B.J.

A82-16705 † Certain theoretical features of astronaut preparation (O nekotorye teoreticheskie osobennosti podgotovki kosmonavtov). G. T. Beregovoi, P. R. Popovich, and G. M. Kolesnikov. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 46-58. In Russian.

Theoretical questions relating to astronaut preparation and training are examined, with attention given to adaptation in both the physiological and psychological senses. Techniques of intellectual preparation are discussed, with emphasis on problem learning. B.J.

A82-16706 † The use of a psychophysiological feedback system for purposes of activity optimization (Ispol'zovanie sistemy obratnoi psikhofiziologicheskoi sviazi v interesakh optimizatsii deiatel'nosti). M. V. Frolov and L. S. Khachatur'iants. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 58-74. In Russian.

The development of a three-loop feedback system for the optimal control of operator activity is considered. Attention is given to methods for evaluating the functional state of an operator based on the analysis of working conditions and variations of physiological signals. As an example, an analysis is presented of states of attention and emotional stress. B.J.

A82-16707 † Psychophysiological correlates of the control activity of the astronaut (Psikhofiziologicheskie korreliaty upravliaiushchei deiatel'nosti kosmonavta). L. S. Khachatur'iants. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 75-86. In Russian.

An abstract algorithmic scheme of astronaut activity is developed, and schemes of human-operator activity in various types of control systems are presented. It is shown that by using the abstract algorithmic scheme the designer can 'adapt' technology to man for the functional state which is expected in the actual conditions of activity. B.J.

A82-16708 † Certain aspects of the visual activity of astronauts (Nekotorye aspekty vizual'noi deiatel'nosti kosmonavta). E. A. Ivanov and A. Ia. Frolov. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 86-100. In Russian.

The paper considers visual observations by astronauts of space objects (e.g., spacecraft that are the objects of rendezvous or docking) illuminated by the sun against the black background of the sky; the visual recognition of such objects is particularly difficult under such illumination conditions. The psychophysiological characteristics of visual pattern recognition and the functional state of the visual analyzer of the astronaut are theoretically evaluated, and experimental results obtained with the Proba visual simulator are examined. B.J.

A82-16709 † Methodological principles of the investigation of pilot error (O metodologicheskikh osnovakh izucheniia oshibochnykh deistvii cheloveka, upravliaiushchego letatel'nym apparatom). N. D. Zavalova and V. A. Ponomarenko. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 100-116. In Russian.

It is argued that the methodology of investigating pilot error has been flawed by taking the concept of personal factors, rather than error theory, to be the underlying postulate. This paper proposes an engineering-psychological systems approach to the study of pilot error. B.J.

A82-16710 † Problems of the control of operator state (Problemy upravleniia sostoianiem operatora). L. P. Grimak and L. S. Khachatur'iants. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 116-137. In Russian.

A survey is presented of problems involved in the control of human-operator state, with particular reference to astronaut performance in flight. A classification of the psychophysiological mechanisms responsible for the formation of operator states is presented. B.J.

A82-16711 † Optimization of astronaut operator activity and systems of semiautomatic control of manned spacecraft on the basis of probabilistic criteria (Optimizatsiia operatorskoi deiatel'nosti kosmonavta i sistem poluavtomaticheskogo upravleniia pilotiruemykh kosmicheskikh korablei po vepoiatnostnym kriteriiam). G. T. Beregovoi, V. M. Vasilets, and A. I. Iakovlev. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 138-146. In Russian.

It is proposed that parametric methods be used to statistically optimize astronaut operator activity and systems of semiautomatic control of manned spacecraft. The basic idea of the approach consists in the development of algorithms that make it possible to select certain controls or parameters (considered as points of a certain space) that satisfy specified constraints and minimize or maximize a specified criterion for a certain number of astronauts participating in the control. The approximation of the control functions in a finite-dimensional space and the limitation of the number of system structure variants make it possible to represent the performance criterion as a function of a finite number of variables and thus to obtain the solution of the optimized problems. B.J.

A82-16712 † Investigation of the statistical characteristics of astronaut operator activity directed towards the control of a manned spacecraft (Issledovanie statisticheskikh kharakteristik

operatorskoi deiatel'nosti kosmonavta po upravleniiu PKA). B. V. Volynov, V. M. Vasilets, E. D. Sukhanov, and A. I. Iakovlev. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 146-155. In Russian.

The dynamic characteristics of astronaut operator activity were studied on simulators, the ultimate purpose of the tests being to provide information for the design of manual control systems. Correlation functions and spectral densities of operator errors were obtained, assuming that the random processes that were analyzed were stationary and ergodic. B.J.

A82-16713 † Investigation of astronaut activity under conditions of the hydrosimulation of weightlessness (Issledovanie deiatel'nosti kosmonavtov v usloviiakh modelirovannoi nevesomosti v gidrosrede). G. I. Vorob'ev and L. D. Smirichevskii. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 156-161. In Russian.

An analysis is presented of the possibilities of the hydrosimulation of weightlessness, where the subject to be tested is submerged in water and a state of zero buoyancy is created. Experimental results are presented concerning the use of weightlessness hydrosimulation in the investigation of astronaut activity, and it is found that simulation results agree with data from actual space flight. It is concluded that the hydrosimulation technique is suitable for astronaut training, for purposes of spacecraft design, and for the development of astronaut-activity cyclograms. B.J.

A82-16714 † Experimental study of the characteristics of the detection of objects on a TV display by an operator under conditions of time deficit (Eksperimental'noe issledovanie kharakteristik obnaruzheniia ob'ektov operatorom na televizionnom indikatore v usloviiakh defitsita vremeni). V. N. Zhovinskii. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 161-166. In Russian.

The present study examines the ability of an operator to detect small objects on a TV display in the case when the observation time period is sufficiently small (up to 3 sec), which corresponds to time-deficit conditions. It is found that the probability of detection increases with exposure time to a certain constant level whose value is determined by the background complexity. It is also found that the mean time of making erroneous decisions in the detection process exceeds the mean time of making correct decisions under time-deficit conditions. B.J.

A82-16716 † The design of extravehicular propulsion units (Ob ustroistve sredstv peremeshcheniia kosmonavta v otkrytom kosmose). Iu. N. Glazkov. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 172-178. In Russian.

The paper describes a self-maneuvering unit that combines jet backpacks with two and three degree of freedom controllable gyroscopes. Block diagrams of of this type of self-maneuvering unit are presented, and attention is given to a number of design problems. B.J.

A82-16717 † *Simulation of operator activity in a system for* the technical servicing of a space station (Modelirovanie deiatel'nosti operatora v sisteme tekhnicheskogo obsluzhivaniia kosmicheskoi stantsii). E. N. Stepanov. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 178-183. In Russian.

Two 30-day experiments are described in which operator activity involving the technical servicing and maintenance of a space station was simulated. Emphasis was placed on the influence of adaptation period, 30-day continuous activity, and 30-day habitation in an isolated and confined space on the operator work capacity and reliability. It was found that the productivity and reliability of repair and servicing work performed under space-station conditions were lower than under ordinary (i.e., non-space) conditions. B.J.

A82-16718 † Information model of the dynamics of autonomous extravehicular activity (Informatsionnaia model' dinamiki avtonomnogo dvizheniia kosmonavta v otkrytom kosmose). E. V. Dement'ev. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 183-187. In Russian.

It is shown that a method of parallel approach control and human visual capacity make it possible to develop a simple extravehicular propulsion unit with total or partial determination of the parameters of relative motion by the astronaut himself. A functional block diagram of the manual control system for this unit is presented. Since he actively participates in the control of the unit, the astronaut acquires information about the actual state of the control process through its information model. The degree of work intensity will depend, in part, on the quantity and character of control parameters indicated on the display devices. B.J.

A82-16719 † Simulation of manual autonomous control of an extravehicular propulsion unit /EPU/ (Modelirovanie ruchnogo avtonomnogo upravleniia ustanovkoi peremeshcheniia kosmonavta /UPK/). L. P. Grimak and E. V. Dement'ev. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 187-191. In Russian.

The paper considers the simulation of the mutual control of an EPU on a simulation test stand, with emphasis on the influence of the psychic and emotional state of the operator. Particular attention is given to the types of vegetative reactions in approach control at various control stages, and to variations of the terminal control parameters as a function of the simulated operator states. It is found that the experienced psychic state has a marked effect not only on the motor functions of the arms but also on the visual analyzer functions. B.J.

A82-16720 † *The influence of certain habitation conditions* on the physiological functions, work capacity, and dream dynamics of man (K voprosu o vliiani nekotorykh uslovii obitaniia na fiziologicheskie funktsii, rabotosposobnosti i dinamiku sna cheloveka). A. N. Litson, A. Ia. Frolov, V. N. Artishchuk, and A. V. Chapaev. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 192-198. In Russian.

The paper describes an experiment which studied the level of physiological activity, work capacity, and dream dynamics of two operators engaged in the task of the technical servicing and repair of a simulated space station with an autonomous life support system in the course of 94 days. It is found that variations of the three factors studied have a marked adaptational character, and the conditions of habitation were found to have a marked effect on motor-analyzer indices. It is concluded that the present data can be used in constructing circadian cyclograms for the activity of operators working in unusual conditions. B.J.

A82-16721 † Investigation of the functions of an astronaut operator in information systems (Issledovanie funktsii kosmonavta-operatora v informatsionnykh sistemakh). N. N. Fefelov and E. A. Cherenkova. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 198-205. In Russian.

An analysis is presented of astronaut speech performance in ground-space and space-ground communication channels. Some recommendations are made concerning the planning of operational communications and the preparation of onboard documentation. It is noted that the form in which the onboard documentation is presented determines the information processing rate and the quality of astronaut performance. It is also noted that the use of short sentences, and concrete and common words make the communications more effective. B.J.

A82-16722 † The effect of emotional stress on astronaut activity in a radio-telegraphy system (Vliianie emotsional'nogo napriazheniia na deiatel'nost' kosmonavta v sisteme radiotelegrafnoi sviazi). A. K. Epishkin. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 205-208. In Russian.

Space flight simulation results are presented concerning the effects of three factors that lead to emotional stress-acceleration loading, weightlessness, and a life-threatening situation - on the performance of an astronaut operator in a radio-telegraphy system. It is found that these three factors produce emotional stress that has a definite effect on the psychophysiological characteristics of the operator. Psychic processes associated with the recoding of informa-

tion and motor coordination are affected. The results confirm that emotional stress has an adverse effect on astronaut activity in flight. B.J.

A82-16723 † **Comparative psychophysiological evaluation of the effectiveness of psychic models of body hypo- and hyperponderousness (Sravnitel'naia psikhofiziologicheskaia otsenka effektivnosti psikhicheskikh modelei gipo- i gipervesomosti tela).** L. P. Grimak. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 208-222. In Russian.

The effectiveness of hypnotically induced states of subjective increases or decreases in body weight is evaluated in light of the potential of such states in the investigation and prophylaxis of the effects of weightlessness encountered during extended space flights. Results are presented of an experiment in which subjects previously exposed to rotation on a centrifuge at 6 g and a short period of weightlessness were subjected to 10 days of strict bed rest alone, or under hypnotic suggestions of either weightlessness or heaviness. Subjective reactions, EEGs, EKGs, REGs, venous pressures, pulse rates, tracking performances, and cardiac morphologies monitored over the course of the experiment reveal clear differences in the reactions of the subjects according to the suggestion employed. The psychic model of hypoponderousness is observed to produce more pronounced changes than observed in an equivalent period of hypokinesia, including a reduction in heart size and tracking ability, while hyperponderousness in many ways acts to counteract the deleterious effects of extended bed rest, particularly with respect to operator activity. A.L.W.

A82-16724 † **Concerning the rationalization of the work and rest schedule of cosmonauts (Nekotorye voprosy ratsionalizatsii rezhimov truda i otdykha kosmonavtov).** A. Ia. Frolov, A. N. Litsov, V. N. Maliugin, V. A. Sutormin, and I. F. Saraev. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 222-233. In Russian.

It is noted that time is often lost in the early part of a flight as cosmonauts adjust physically to conditions of weightlessness. In seeking to make this time up, use is made of the time allotted for rest and sleep, thereby bringing on fatigue. In scheduling the activities of cosmonauts, it is pointed out that consideration should be given to biorhythms and to the psychophysiological structure of the activity that the cosmonauts are called upon to perform. C.R.

A82-16725 † **The activity of psychic models of hypogravity during 30-day experiments (Aktivnost' psikhicheskikh modelei gipovesomosti tela v tridtsatisutochnykh eksperimentakm).** L. P. Grimak. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 233-239. In Russian.

Experiments are described that seek to determine the length of time that a hypnotically induced feeling of hypogravity can persist. During the experiment, the subjects perform functions similar to those that would be performed during a flight. C.R.

A82-16726 † **Psychophysiological safety control in long-duration space flights (K voprosu psikhofiziologicheskogo obespecheniia bezopasnosti kosmicheskogo poleta bol'shoi prodolzhitel'nosti).** V. S. Mishchenko. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 239-247. In Russian.

The evaluation of psychophysiological stress, an important indicator of cosmonaut work capacity, is discussed in light of the increasing range of tasks to be performed in space flights of increasing duration. An approach to the determination of the dynamics and levels of psychophysiological stresses is considered which is based on qualitative and quantitative expert determinations of such factors as the state of weightlessness adaptation, physiological condition, subjective feelings, complaints, fatigue, exhaustion, sleep quality, work duration, work difficulty and productivity, and the importance of the work-rest cycle to cosmonaut work capacities is emphasized. Results are then presented of an analysis of the psychophysiological stress encountered in a ground-based space flight simulation, and patterns in overall psychophysiological condition as a function of experiment duration are illustrated. A.L.W.

A82-16727 † **The effects of a light blue background on the operator visual analyzer (Vliianie golubogo fona na zritel'nyi analizator operatora).** E. N. Khludeev. In: Astronaut activity in flight and enhancement of its efficiency. Moscow, Izdatel'stvo Mashinostroenie, 1981, p. 248-251. In Russian.

The use of an illuminated visual field to improve operator performance in the detection and tracking of a manned spacecraft or orbital station against the background of the starry sky is studied. Experiments to assess operator performance, comfort and fatigue during an observation task were made under normal conditions, with stars and spacecraft against a black background, and with stars and spacecraft seen against a light blue background to improve visual resolution and prevent fatigue, with operators experiencing post-hypnotic suggestions of weightlessness, hypergravity, stresses and mental stimulation. The probability of detecting the moving spacecraft against the light blue background is found to be significantly greater than that of detecting it against the dark background, particularly in the presence of a time limit under all the experimental conditions. The subjects also reported less fatigue when searching for the object against the illuminated background. Results thus demonstrate the usefulness of visual field illumination in spacecraft detection against a background of stars. A.L.W.

A82-16801 † **The effects of hyperventilation on EEG alpha-rhythm depression induced by a suggested visual representation (Vliianie giperventiliatsii na depressiiu alpha-ritma EEG, vyzvannuiu vnushennym zritel'nym predstavleniem).** R. D. Shmel'kina (Ukrainskii Institut Usovershenstvovaniia Vrachei, Kharkov, Ukrainian SSR). *Zhurnal Nevropatologii i Psikhiatrii im. S. S. Korsakova,* vol. 81, no. 9, 1981, p. 1379-1381. In Russian.

A82-16802 † **The effects of immobilization stress on diacyl and plasmogenic phospholipids in various organs and tissues of the rat (Vliianie immobilizatsionnogo stressa na diatsil'nye i plazmalogennye formy fosfolipidov v razlichnykh organakh i tkaniakh krys).** V. M. Dembitskii (Cheliabinskii Gosudarstvennyi Universitet, Chelyabinsk, USSR) and V. E. Riabinin (Cheliabinskii Meditsinskii Institut, Chelyabinsk, USSR). *Voprosy Meditsinskoi Khimii,* vol. 27, Sept.-Oct. 1981, p. 698-701. 21 refs. In Russian.

A82-16803 † **Extra-erythrocytic hemoglobin and iron-bearing hemoglobin destruction products - A system for the amplification of the toxic effects of hyperoxia (Vneeritrotsitarnyi gemoglobin i zhelezosoderzhashchie produkty destruktsii gemoglobina - Sistema usileniia toksicheskogo effekta giperoksii).** A. I. Lukash and V. V. Vnukov (Rostovskii Gosudarstvennyi Universitet, Rostov-on-Don, USSR). *Voprosy Meditsinskoi Khimii,* vol. 27, Sept.-Oct. 1981, p. 616-618. 12 refs. In Russian.

A82-16804 † **Trial of an automated EKG analysis system in a cardiological clinic (Opyt ispytaniia sistemy avtomatizirovannogo analiza EKG v kardiologicheskoi klinike).** S. L. Korsakas, A. A. Kirmonas, L. I. Gargasas, A. L. Vainoras, L. I. Kalashaitite, A. I. Astrauskas, and P. V. Zabela (Kaunasskii Meditsinskii Institut, Kaunas, Lithuanian SSR). *Kardiologiia,* vol. 21, Sept. 1981, p. 109-112. 16 refs. In Russian.

Results are presented of a clinical trial of a computerized system for EKG evaluation in cardiac patients. The system, based on the ES-1022 computer, includes an automated electrocardiograph for the acquisition and recording of EKG signals and data input and output systems, as well as programs for input, identification, measurement, rhythm determination, contour analysis, file formation, search and overall regulation. Computer diagnoses of patients with various types of disrhythmias and cardiac pathologies including ischemia and ventricular hypertrophy made by the system as a whole are found to be in agreement with physician diagnoses in 82% of the cases. When the results of both diagnoses are compared with anatomical, clinical and X-ray data, however, the computer results are shown to be little inferior to those of the physicians in terms of either sensitivity or specificity. It is thus proposed that the computer system be incorporated into medical practice. A.L.W.

A82-16805 † **The ergometric determination of myocardial reserves (Opredelenie miokardial'nogo rezerva pri ergometrii).** V. P. Pomerantsev, Iu. S. Mdinaradze, E. A. Prokhorovich, and Iu. A. Vasiuk (Moskovskii Meditsinskii Stomatologicheskii Institut, Mos-

cow, USSR). *Kardiologiia,* vol. 21, Sept. 1981, p. 68-72. 11 refs. In Russian.

An analysis is presented of possible methods for the assessment of myocardial reserves, expressing myocardial capacity for increased cardiac ejection and an indicator of myocardial ischemia, based on the use of ergometric indicators. The methods considered involve various indirect determinations of myocardial reserves by measurements of systolic arterial pressure, heart rate and electrocardiograms during physical loading to derive the heart minute volume and stroke volume. Clinical studies are presented which have demonstrated the correlation of changes in these indicators during exercise with the degree of cardiac insufficiency in patients with post-infarction cardiosclerosis and hypertension. A procedure for the evaluation of myocardial reserves in symptomless patients is then suggested. A.L.W.

A82-16806 † **Experience with the development and application of telemetric computing systems in cardiology (Opyt razrabotki i primeneniia telemetricheskikh vychislitel'nykh sistem v kardiologii).** Zh. V. Chepaitis, E. I. Raugalas, A. I. Matuzonis, B. G. Shlapikene, and D. V. Lukshene (Kaunasskii Meditsinskii Institut, Kaunas, Lithuanian SSR). *Kardiologiia,* vol. 21, Sept. 1981, p. 112-115. 5 refs. In Russian.

A specialized telemetric computing system has been developed for applications in the mass screening of limited populations and the intensive monitoring of patients for signs of ischemic heart disease. The system is composed of an EKG monitoring subsystem, an automatic EKG analysis subsystem and a graphical data processing subsystem acting as an auxiliary to the first two subsystems, all of which exchange information through a common data base developed for the storage of the monitoring data. Experience has shown that, with the proper methodological approach, the use of automatic computing systems has decisive advantages over traditional diagnostic and monitoring methods in certain applications requiring the analysis of massive amounts of data. A.L.W.

A82-16807 † **Possible model representations of the neurophysiological mechanisms for the analysis of the direction and speed of a moving visual object (Vozmozhnye model'nye predstavleniia o neirofiziologicheskikh mekhanizmakh analiza napravleniia i skorosti dvizheniia zritel'nogo ob'ekta).** Iu. P. Aleinikov, T. V. Aleinikova, and T. V. Mel'kovskaia (Rostovskii Gosudarstvennyi Universitet, Rostov-on-Don, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 67, Aug. 1981, p. 1201-1207. 8 refs. In Russian.

Models of the detection of the direction and speed of the motion of a visual object at the level of the visual tectum of frogs are examined in order to clarify the possible neurophysiological mechanisms of motion parameter extraction from initially undifferentiated retinal signals. The models rely on the interactions of excitatory and inhibitory synapses on neurons forming part of the visual motion analyzer which are excited by ganglioretinal cells responsive to motion in different directions or at different speeds. In contrast to the two separate models developed, it is emphasized that in the actual tectum, motion direction and speed analyses are apparently performed by the same neurons. A.L.W.

A82-16808 † **The age characteristics of physical thermoregulation (Vozrastnye osobennosti fizicheskoi termoreguliatsii).** V. I. Basakin (Institut Fizicheskoi Kul'tury, Leningrad, USSR). *Fiziologiia Cheloveka,* vol. 7, Sept.-Oct. 1981, p. 940-942. In Russian.

The thermoregulatory efficiencies of persons of different ages and sexes are evaluated. Skin temperatures over various parts of the body and the response of forearm temperature to local cooling were determined for male and female subjects aged from 1 to 90 years. An inverse relationship is found between subject skin temperature on the forehead, chest, shoulder, forearm and foot and subject age. Women in the 8-12, 18-25, and 36-60 age groups are observed to have higher skin temperatures than the men of the corresponding age groups, while in the remaining groups no sex difference is evident. Trunk-extremity temperature gradients are found to be less pronounced in children than in older age groups. The time required for the reestablishment of original skin temperature following local cooling is also observed to be shorter in the younger people than in the old, and in women from 12 to 60 than in men of the same age. The results may be explained in terms of the activation of the sympathetic nervous system by thyroid activity. A.L.W.

A82-16809 † **A procedure for the measurement of the critical flicker fusion frequency (Metodika izmereniia kriticheskoi chastoty sliianiia mel'kanii).** V. A. Gavrilov (Tomskii Gosudarstvennyi Universitet, Tomsk, USSR). *Fiziologiia Cheloveka,* vol. 7, Sept.-Oct. 1981, p. 947-949. 5 refs. In Russian.

A facility is presented which allows the measurement of critical flicker fusion frequency in humans with a greater accuracy than previously achieved. The system comprises a control unit, response circuit, flicker generation circuit including sawtooth voltage generator, voltage-frequency transformer and power amplifier, measurement circuit and optical system. As the system is not based on a mechanical light generation circuit, measurement error associated with system inertness and the shutter activation is eliminated. The use of an operational amplifier allows a high degree of linearity in frequency changes, with frequency error less than 0.06 Hz and measurement error less than 0.1%. In addition, the rate of change of flicker frequency can be adjusted from 0.5 to 1 Hz/sec in the range 10 to 80 Hz. A.L.W.

A82-16810 † **The reorganization of EEG structure during adaptation to the Antarctic (Perestroiki struktury EEG, v protsesse adaptatsii v Antarktide).** S. I. Soroko (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologiia Cheloveka,* vol. 7, Sept.-Oct. 1981, p. 909-916. 23 refs. In Russian.

Changes in the internal structure of brain biorhythmics as revealed by the statistical structure of EEG rhythm interactions during the process of adaptation to Antarctic conditions are investigated. Electroencephalograms were obtained with eyes open and eyes closed in 122 polar workers during the 17th Soviet Antacrtic expedition, and compared with evaluations of nervous system adaptability made on the basis of tests of the plasticity of individual cerebral neurodynamic processes. Results show a shift of the EEG frequency spectra towards lower frequencies as well as substantial rearrangements in the interconnections between the separate rhythms during adaptation. In persons showing a high level of adaptability, the ultimate EEG pattern developed is characterized by a significant strengthening of the statistical relations of the individual rhythms with the alpha and theta rhythms, and an increase in the interrelationship between the successive waves within those rhythms. In persons showing low adaptability, a new EEG pattern is not formed, and a marked instability of the statistical relations of the EEG rhythms is observed. The expression of neurotic states is found to be accompanied by a specific EEG pattern with a functional core in the theta-rhythm region. A.L.W.

A82-16811 † **Investigation of physiological compensation processes following the surgical destruction of the labyrinth (Issledovanie protsessov kompensatsii funktsii organizma posle khirurgicheskoi destruktsii labirinta).** V. T. Pal'chun, G. I. Gorgiladze, M. I. Kadymova, and Iu. O. Bulaev (II Moskovskii Meditsinskii Institut, Moscow, USSR). *Vestnik Otorinolaringologii,* Sept.-Oct. 1981, p. 7-12. 10 refs. In Russian.

The development and stability of processes in the central nervous system arising as compensation for the unilateral surgical destruction of the labyrinth are studied. Evaluations of equilibrium stability during walking and in the Romberg position, spontaneous and positional nystagmus and the response of the intact labyrinth to caloric and electrical stimulation were made up to 2 years following labyrinthectomy in patients suffering from Meniere's disease and limited labyrinthitis. A relatively rapid development of compensatory processes is observed in the sensory and vegetative functions, while spontaneous falling nystagmus and asymmetrical muscle tone persist for at least two years. The elimination of visual fixation, as well as mental work, changes in otolith orientation and alcohol intoxication, are found to facilitate vestibular asymmetry. Patient nystagmus and responses to cold stimulation during the first week after surgery indicate the rapid development of central nervous system compensation. Results support labyrinthectomy as the method of choice in the treatment of unilateral peripheral disorders of the vestibular apparatus combined with a high degree of amblyacousia. A.L.W.

A82-16812 † **Investigation of the otolith apparatus in clinical practice (Issledovanie otolitovogo apparata v klinicheskoi praktike).** A. O. Radzhabov and Iu. O. Bulaev (II Moskovskii Meditsinskii Institut, Moscow, USSR). *Vestnik Otorinolaringologii,* Sept.-Oct.

1981, p. 79-82. 56 refs. In Russian.

Clinical investigations of otolith functions are reviewed to illustrate the methods currently available for clinical application. Attention is given to uses of eyeball counterrotation as an indicator of otolith function, with emphasis of the Fischer method of visual afterimages, methods based on the influence of the otolith on postrotation reflexes, including the otolith reaction method with a rotating chair, and utricular and saccular gaits, the use of graded inclinations to determine otolith sensory thresholds, a standing task on a low bar to assess equilibrium functions, posturography, and four-bar swings. The Fischer method of indirect otolithometry and the use of small-amplitude stimulation on parallel four-bar swings for direct otolithometry are recommended as appropriate for use in clinical practice. A.L.W.

A82-16813 † The differential diagnosis of an asymmetrical trend in vestibular responses in peripheral and central hemispheric lesions (Differentsial'naia diagnostika asimmetrichnogo techeniia vestibuliarnykh reaktsii pri perifericheskom i tsentral'nom polusharnom porazheniiakh). N. S. Blagoveshchenskaia (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Vestnik Otorinolaringologii,* Sept.-Oct. 1981, p. 3-7. 20 refs. In Russian.

Methods allowing the detection and differential diagnosis of vestibular asymmetries of peripheral and central hemispheric origin are presented. The methods involve the monitoring of nystagmic reaction to application of caloric stimuli to each ear, exposure to graded levels of relatively low-intensity rotation, or a combination of rotatory and caloric stimulation. It is noted that the most marked hemispheric asymmetries appear in deep subcortical foci in the temporo-parieto-frontal region during the decompensation phase, giving rise to a strengthening of nystagmus towards the focus. It is also pointed out that the predominant direction of nystagmus in hemispherical asymmetries may vary with the course of the disease and with the vestibular stimulus applied. A.L.W.

A82-16814 † The response of the hematic system of adrenalectomized mice to stressor activity (Reaktsiia sistemy krovi adrenalektomirovannykh myshei na stressornoe vozdeistvie). P. D. Gorizontov, M. I. Fedotova, and L. N. Egorova. *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* Sept.-Oct. 1981, p. 36-39. 7 refs. In Russian.

Mechanisms leading to the changes observed in the hematic system in the two days following a single exposure to stress are investigated in a study of the response of adrenalectomized mice to a 6-hr immobilization. The cellular composition of the peripheral blood, bone marrow cell populations and amounts of karyocytes in the spleen and thymus were determined periodically following the immobilization on their backs of 170 adrenalectomized and 110 sham-operated mice. Whereas the peripheral levels of neutrophilic granulocytes initially rose then returned to their original values in both groups of animals, lymphocyte numbers are observed to increase following immobilization in the adrenalectomized mice and decrease in the controls. Bone marrow populations of lymphoid cells, neutrophilic granulocytes and mature neutrophilic cells are observed to undergo variations typical of the stress reaction in adrenalectomized and control animals alike, although the stem cells in the bone marrow of the experimental animals failed to increase and in fact decreased during the period of observation. Whereas the characteristic diminution in spleen cells is observed in both groups, the increase in thymus cells is much less marked in the adrenalectomized than in the control mice. Results thus demonstrate that changes in only peripheral blood lymphocyte numbers, thymus cell numbers and bone marrow stem cell numbers depend on the adrenal hormones. A.L.W.

A82-16815 † The effects of immobilization on the development of experimental atherosclerosis in rabbits (Vliianie immobilizatsii na razvitie eksperimental'nogo ateroskleroza u krolikov). G. P. Deriagina (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) and T. A. Sinitsyna (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* Sept.-Oct. 1981, p. 32-36. 17 refs. In Russian.

A82-16816 † Changes in Hageman factor system indicators during human adaptation to intense physical loading (Izmeneniia pokazatelei 'sistemy faktora Khagemana' pri adaptatsii cheloveka k intensivnoi fizicheskoi nagruzke). A. M. Chernukh, O. A. Gomazkov, N. V. Komissarova, L. A. Lantsberg, and N. M. Shkol'nik (Akademiia Meditsinskikh Nauk SSSR; Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Moscow, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* Sept.-Oct. 1981, p. 25-28. 6 refs. In Russian.

Changes in the blood kallikrein-kinin, thrombin and plasmin systems, which collectively make up the Hageman factor system (HFS), accompanying intensive physical training are investigated. Precursors and inhibitors of kallikrein, thrombin and plasmin were determined in blood taken at rest and following maximal bicycle ergometer exercise from untrained healthy men, athletes during a period of intensive training and preparation for competition, and athletes following the end of the competitive season. Levels of the three precursors and of the plasmin and thrombin inhibitors are found to be higher in the training athletes than in either the controls or the recovering athletes, while the kallikrein inhibitor values are lower. Short-duration maximal exercise is observed to lead to increases in precursor levels and decreases in inhibitor levels in the controls and nontraining athletes, and decreases in all indicators with the exception of the plasmin inhibitor in active athletes. Results demonstrate the diagnostic and prognostic value of HFS determinations in the norm, in various cardiovascular pathologies, and during adaptation to prolonged physical loads. A.L.W.

A82-16817 † Biogenic monoamine concentrations in autonomic nervous system ganglia during acute experimental emotional stress (Soderzhanie biogennykh monoaminov v uzlakh avtonomnoi nerunoi sistemy krolika pri ostrom eksperimental'nom emotsional'nom stresse). V. V. Portugalov, N. V. Petrova, S. I. Kashtanov, and B. N. Manukhin (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Patologicheskaia Fiziologiia i Eksperimental'naia Terapiia,* Sept.-Oct. 1981, p. 28-32. 18 refs. In Russian.

A82-16818 † A modified kinetic model of muscular contraction (Modifitsirovannaia kineticheskaia model' myshechnogo sokrashcheniia). E. M. Timanin (Akademiia Nauk SSSR, Institut Prikladnoi Fiziki, Gorki, USSR). *Biofizika,* vol. 26, Sept.-Oct. 1981, p. 915, 916. 8 refs. In Russian.

A modification of the kinetic model of the interaction of contractile proteins of Deshcherevskii (1977) is presented which may be used in the construction of a set of models describing the entire process of muscular contraction. The present model takes into account the effects of the blockage of actin centers by troponin, and may be used to describe the growth and relaxation of muscular tension. In the limit of complete activation (troponin derepression) by Ca(2+) ions, it becomes identical to that of Deshcherevskii. A.L.W.

A82-16819 † Analysis of retinal work in the discrimination of a contour signal (Analiz raboty setchatki, vydeliaiushchei konturnyi signal). D. G. Lebedev (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR). *Biofizika,* vol. 26, Sept.-Oct. 1981, p. 860-863. In Russian.

A comparative analysis is presented of the construction of the finite-difference Laplacian of the initial illumination distribution of light-sensitive retinal receptors by a mechanism based on lateral inhibition and according to the drift of the visual axis of the eye. Models of object shape discrimination by both mechanisms are developed taking into account the spread in the characteristics of the visual receptors and other retinal components observed in the eye itself. It is shown that whereas the lateral inhibition mechanism is much simpler, the visual axis drift mechanism, as used in models of the human visual system, provides a means of suppressing output signal noise caused by retinal element nonuniformities. A.L.W.

A82-16820 † Model for the perception of moving and fixed objects (Model' vospriiatiia dvizhushchikhsia i nepodvizhnykh ob'ektov). I. S. Losev and T. M. Shura-Bura (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR). *Biofizika,* vol. 26, Sept.-Oct. 1981, p. 854-859. 9 refs. In Russian.

A two-dimensional model is developed and examined which reproduces phenomena connected with the visual perception of objects moving and fixed with respect to the retina. The model comprises a set of operations, including a logarithmic operation, smoothed differentiation with respect to time, spatial discrimination and reduction, to represent the sensation produced by an initial

distribution of illumination on the retina as a function of time. Among the phenomena accounted for by the model are the generation of the empty field, the maintenance of normal vision during ocular drift, the comet phenomenon, changes in perceived brightness upon the stabilization of object sector boundaries, the perception of objects undergoing short-periodic oscillations and the perception of a continuously varying brightness distribution. The model is used to make theoretical predictions concerning some of these phenomena. A.L.W.

A82-16821 † **Prevention of hypoxic heart damage by the use of oxypyridine-class antioxidants (Preduprezhdenie gipoksicheskogo povrezhdeniia serdtsa s pomoshch'iu antioksidanta iz klassa oksipiridinov).** F. Z. Meerson, N. A. Abdikaliev, and L. Iu. Golubeva (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 92, Sept. 1981, p. 281-283. 11 refs. In Russian.

A82-16822 † **Damage and repair of heart muscle DNA during emotional-pain stress (Povrezhdenie i reparatsiia DNK serdechnoi myshtsy pri emotsional'no-bolevom stresse).** F. Z. Meerson and V. K. Vasil'ev (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 92, Sept. 1981, p. 297-299. 12 refs. In Russian.

A82-16823 † **The functional state of some subcortical cerebral structures during adaptation and deadaptation to physical loading (Funktsional'noe sostoianie nekotorykh podkorkovykh struktur mozga pri adaptatsii i deadaptatsii k fizicheskoi nagruzke).** V. M. Boev (Orenburgskii Meditsinskii Institut, Orenburg, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 92, Sept. 1981, p. 271-273. 13 refs. In Russian.

Changes in the functional condition of deep structures in the brain during the prolonged adaptation and deadaptation of rabbits to physical loading are investigated. Chronically implanted bipolar electrodes were used to monitor the local blood flow and excitability of the dorsal hippocampus, reticular formation of the midbrain, ventromedial hypothalamic nuclei and thalamic caudate and anteromedial nuclei in rabbits during a 120-day training period of submaximal and maximal treadwheel running and the 30-day period following the cessation of training. Initial periodic variations in the functional activity of all the structures studied with the exception of the hypothalamus are observed to stabilize at either enhanced or reduced levels by the 20th day of training, indicative of an adaptive response to submaximal physical loading. Exercise to the limit is observed to induce changes in the activities of the dorsal hippocampus, hypothalamus and particularly the reticular formation. The earliest stages of deadaptation are characterized by reductions in dorsal hippocampus and hypothalamic excitability, while reticular formation excitability is reduced to its original level only on the 30th day after the completion of training. A.L.W.

A82-16824 † **Morphology of experimental pneumoconiosis arising from the effects of lunar soil (Morfologiia eksperimental'nogo pnevmokonioza, razvivaiushchegosia pod vozdeistviem lunnogo grunta).** Iu. D. Batsura, G. G. Kruglikov, and V. D. Arutiunov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 92, Sept. 1981, p. 376-379. 5 refs. In Russian.

The morphological effects of the inspiration of lunar soil particles are examined in an electron microscopic study. Pneumoconiosis was induced in albino rats by the intratracheal introduction of a suspension of finely dispersed lunar soil (brought back by Luna-16 from Mare Foecunditatis) in a starch solution; lung and trachoebronchial morphologies and phagocytitic activity were assessed after 3 days, 3 months and 6 months. Lung pathologies are observed to develop by an inflammatory response characterized by intense leucocyte and macrophage responses in the early stages, and, in later stages the thickening of the basal layer of the blood-air barrier, the activation of fibroblasts, cell associations and fibrosis, and the blockage of the terminal sections of the lymphatic system in response to the passage of 0.5-micron particles. The degree of fibrosis is found to be on the order of that associated with the weakly fibrogenic dusts. A.L.W.

A82-16825 † **The effects of heat stress on the morphogenetic potencies of the nephron epithelium (Vliianie teplovogo stressa na morfogeneticheskie potentsii epiteliia nefrona).** O. Z. Mkrtchan (Tiumenskii Gosudarstvennyi Universitet; Tiumenskii Meditsinskii Institut, Tyumen, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 92, Sept. 1981, p. 352-355. 11 refs. In Russian.

The effects of heat traumas on the proliferation, growth and differentiation of the rat nephron epithelium are investigated in cultures grown within the organism. Sections of decapsulated kidneys taken from 6-month-old rats exposed to a heat stress of 45 C for 60 min and from control rats were implanted under the skin of the abdominal wall of recipient 2-month-old rats, and the implants were extirpated periodically for up to 30 days following implantation. The heat stress is observed to lead to a deterioration in kidney hemodynamics, associated with an increase in vascular permeability, ischemia of the cortical juxtamedullar zone and distrophic changes in the proximal and distal nephron sections. In both the healthy and experimental implanted kidneys, a vascular-tissue reaction is observed to take place, leading to the formation of connective capsules, intercelloidin layers and vessels in the implant. In comparison to the control implant, however, the experimental implant is found to exhibit intensified proximal and capsular destruction and a prolonged period of proliferative growth. The method employed is concluded to be useful for the development of objective criteria for the effects of extremal factors on tissue and organ properties. A.L.W.

A82-16830 * **Effects of disuse by limb immobilization on different muscle fiber types.** F. W. Booth, M. J. Seider (Texas, University, Houston, TX), and G. R. Hugman (Baylor University, Houston, TX). In: Plasticity of muscle. Berlin, Walter de Gruyter und Co., 1980, p. 373-383. 33 refs. Grant No. NIH-AM-19393; Contract No. NAS9-15388.

The effects of disuse by limb immobilization on different muscle fiber types are reviewed. It is demonstrated that many changes occurring in atrophying skeletal muscles of young rats can be explained by the duration of the half-lives of muscle proteins. Differences are found to exist in responses of fast- and slow-twitch muscles due to disuse atrophy, and the appearance of plasticity in skeletal muscle begins to occur very soon after changes in the level of contractile activity. Rates of protein degradation increase in slow-twitch muscles at rapidly growing rates after approximately one day of limb immobilization; however, no change in the rates of protein degradation is noted in fast-twitch muscles of young rats. D.L.G.

A82-16833 * **Reissner's membrane and the spiral ligament in normal rats and those treated with ethacrynic acid.** M. D. Ross. In: Ménière's disease: Pathogenesis, diagnosis and treatment; Proceedings of the International Symposium, Düsseldorf, West Germany, May 1980. Stuttgart, Georg Thieme Verlag; New York, Thieme-Stratton, Inc., 1981, p. 76-86. 38 refs. Grants No. NsG-9047; No. NIH-NS-13428.

A description is presented of recent ultrastructural findings in Reissner's membrane and the spiral ligament in rats treated daily with ethacrynic acid during the 2nd and 3rd weeks of postnatal life, a period of final maturation of the inner ear and its fluids. A distension of Reissner's membrane in every cochlear turn, indicative of mild endolymphatic hydrops, was found to occur in animals that received a higher dose of ethacrynic acid. Ultrastructurally, the cytoplasm of the epithelial cells of Reissner's membrane showed increased electron density after treatment with ethacrynic acid. This increase was most pronounced in animals treated with a greater quantity of the drug. The epithelial cells had similar ultracellular features throughout except that the cells were much thinner in the region of maximal distension. G.R.

A82-16892 **Principles of feature integration in visual perception.** W. Prinzmetal (British Columbia, University, Vancouver, Canada). *Perception and Psychophysics,* vol. 30, no. 4, Oct. 1981, p. 330-340. 22 refs. Natural Sciences and Engineering Research Council of Canada Grant No. A-7039.

The results of four experiments using conjunction errors to determine principles which could predict which features of a stimulus display are integrated by the visual system are presented. Specific attention was given to the location principle, to see if features located close together in space would be joined, and the perceptual group principle, to observe if the visual system would join

features from stimulus items forming the same perceptual group or pattern. Subjects were presented tachistoscopic displays of two rows of circles and were asked to determine if there had been a 'plus' sign present in one of the circles. The rows were varied in orientation in space and to one another, and also in color. The perceptual group principle was found to be a good predictor of feature recognition, whereas the location principle was not. Further studies to determine if perceptual organization affects feature abstractions as well as feature integration are indicated. M.S.K.

A82-16893 Is recognition accuracy really impaired when the target is repeated in the display. C. W. Eriksen, N. Morris, Y.-Y. Yeh, W. O'Hara, and R. T. Durst (Illinois, University, Urbana, IL). *Perception and Psychophysics,* vol. 30, no. 4, Oct. 1981, p. 375-385. 25 refs. Grant No. PHS-MH-01206.

Bjork and Murray (1977) have presented a feature-specific interactive channels model that predicts perceptual interference between letters presented simultaneously in visual displays. Maximum interference is predicted when a target letter is presented with an identical letter. In their experiment, Bjork and Murray found support for their model, but their results could have occurred artifactually from response biases of their subjects. Santee and Egeth (1980) used a different paradigm that eliminated the possibility of this particular response bias and reported that their data supported the feature-specific model. However, the present paper shows that analysis of their data by Santee and Egeth was incomplete and the comparisons inappropriate. In two experiments that used the Santee and Egeth paradigm, support was not found for the feature-specific model when more detailed analyses of the data were undertaken. In a third experiment, one that used the Bjork and Murray paradigm, but with control of response bias, no significant or suggestive evidence was found that feature similarity between noise and target letters affected recognition of the latter. (Author)

A82-16926 Basic environmental problems of man in space; Proceedings of the Sixth International Symposium, Bonn, West Germany, November 3-6, 1980. Symposium sponsored by the International Academy of Astronautics. Edited by K. E. Klein and J. R. Hordinsky (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Cologne, West Germany). *Acta Astronautica,* vol. 8, Sept.-Oct. 1981. 298 p.

Summaries were given of biomedical research on manned and biosatellite spacecraft from the U.S. and U.S.S.R. Papers were presented on investigations of the effects of spaceflight on human cardiovascular and pulmonary systems. Attention was also paid to studies involving endocrinology, hematology, and immunology, as well as neurology and psychology in spaceflight, with emphasis on the causes and prevention of space sickness. Changes worked on the human musculoskeletal system by hypogravity, hypokinesia, and long duration spaceflight are examined, and preventive health maintenance and medical care in spaceflight are considered. The calcium loss mechanism was explored, and biotechnology for emergency and rescue conditions and trends in life support equipment are reviewed. Finally, future missions for U.S. and U.S.S.R. space activities are outlined. M.S.K.

A82-16927 * U.S. manned space flight: The first twenty years - A biomedical status report. L. F. Dietlein (NASA, Johnson Space Center, Houston, TX) and R. S. Johnston (Texas, University, Houston, TX). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 893-906. 5 refs.

In the last 20 years, the biomedical problems facing man in space have been brought into sharper focus. Space motion sickness is presently the most serious problem. Its etiology remains obscure, but the 'sensory conflict' theory appears most plausible. No valid predictive tests of susceptibility exist and presently medication for prevention or mitigation of symptoms must be relied on. Adaptation/biofeedback techniques may prove useful. Cardiovascular 'deconditioning' may be effectively attenuated by use of anti-g suits or plasma expanding techniques. Recent bedrest simulation studies would seem to indicate that concerns about chronically elevated central venous pressure during space flight are unfounded. The loss of red cell mass in space flight appears to be self-limited, independent of mission duration, and not of clinical concern, based on recent Soviet experiences. And finally, clodronate, a new diphosphonate effective in preventing hypercalciuria and negative calcium balance in normal human bedrested subjects, may prove effective in preventing or lessening skeletal mineral loss in space. (Author)

A82-16928 Summary of medical investigations in the U.S.S.R. manned space missions. O. G. Gazenko, A. M. Genin, and A. D. Egorov (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 907-917. 6 refs.

Russian medical investigations of the effects of spaceflight on human physiology are reported. Short duration flights at the beginning of the Russian space program revealed vestibulo-autonomic disorders due to weightlessness and deconditioning to work loads and earth gravity. Vestibulo-autonomic disorders were found to recur among 30% of the cosmonauts once longer spaceflights were undertaken. Pulse blood filling of the head persisted for 3-4 months of flight, yet decreased in the legs, and oxygen debt grew as a function of flight length. Hypertrophy of the leg muscles and the long wide back and neck muscles occurred from the absence of gravity, slowing only when countered with vigorous exercise programs. All changes, even after the 175-day flight, were seen to be reversible after varying periods of time back on earth, although it is noted that even longer flights may result in social-psychological problems which are not yet predictable. M.S.K.

A82-16929 Summary of experiments onboard Soviet biosatellites. S. O. Nikolaev and E. A. Il'in (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 919-926. 54 refs.

Physiological, morphological and biochemical studies of mammals flown on board biosatellites of the Cosmos series revealed changes in their cardiovascular, musculoskeletal, endocrine and vestibular systems. Space flight resulted in moderate stress reactions, intralabyrinthine conflict information during movements, and changes in fluid-electrolyte metabolism. Exposure to artificial gravity (1 g) decreased the level of myocardial, musculoskeletal and excretory changes, but disturbed the function of equilibrium. Studies with combined weightlessness and ionizing radiation demonstrated that weightlessness did not produce a significant modifying effect on radiation damage and postradiation recovery. Consistent changes in certain systems of animals and humans in weightlessness confirm the practical importance of biosatellite studies, which also contribute to the solution of general biology problems associated with gravity effects on life processes. (Author)

A82-16930 * U.S. biological experiments in space. H. P. Klein (NASA, Ames Research Center, Moffett Field, CA). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 927-938. 68 refs.

The history of biologic experimentation in space is traced. Early balloon and rocket borne animals showed no abnormalities on the macroscale, and biosatellite launches with bacteria and amoebae revealed no microscopic dysfunctions. Adult Drosophila flies on board Cosmos spacecraft died with a shortened lifespan, while their offspring lived full lifespans. Green pepper plants grown in weightlessness showed a different orientation, but no physiological disturbances. Normal bone growth in rats has been found to almost cease after 11 days in space, and the mean life span of red blood cells decreases by four days. A series of experiments designed by U.S. scientists will be performed on primates provided and flown by the U.S.S.R. Finally, experiments on board Spacelab will involve determination of the persistence of circadian rhythms in bacteria and humans. M.S.K.

A82-16931 Current views and future programs in cardiovascular physiology in space. K. A. Kirsch and H. von Ameln (Berlin,

Freie Universität, Berlin, West Germany). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica*, vol. 8, Sept.-Oct. 1981, p. 939-950. 20 refs. Research supported by the Bundesministerium für Forschung und Technologie.

The volume shift of 2000 cu cm from the lower to the upper part of the human body during weightlessness gave rise to theoretical and practical questions which are addressed in this communication. The analysis revealed that the mobilized fluid reduced the interstitial fluid of the lower extremities by 40%. Applying the current ideas in the field of interstitial tissue physiology to these problems, one must conclude that the fluid displacement can only be brought about by a change of the interstitial tissue compliance. Based on the observations made by the astronauts and on the working hypothesis of the authors, a method was proposed to follow the fluid migration and to measure the tissue compliance in man. Results are reported from experiments under terrestrial conditions. They show that the tissue compliance indeed can be modulated. Applying the method in space can eventually help to clarify several concepts in terrestrial physiology. (Author)

A82-16932 Cardiovascular reflexes during rest and exercise modified by gravitational stresses. F. Bonde-Petersen (Copenhagen, Universitet, Copenhagen, Denmark). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica*, vol. 8, Sept.-Oct. 1981, p. 951-958. 10 refs. Research supported by the Danish Space Council and Statens Laegevidenskabelige Forskningsrad.

The effects of negative and positive pressure during rest and exercise were studied to determine whether variations in central venous pressure via the low pressure baroreceptors modifies the arterial baroreceptor function. Seven males in supine position were measured by an Xe-133 washout technique, revealing that increased sympathetic nervous activity of central origin overrides the local veno-arterial reflex. The subjects also underwent hand-grip exercise in a pressure tank or an anti-g suit and were monitored for cardiac output, forearm blood flow, blood pressure, heart rate, total peripheral resistance, and stroke volume. Two regulatory mechanisms were found for skin blood flow, one a veno-arteriolar local reflex mechanism and one in the central nervous system, implying that hydrostatic skin pressure and global vasoconstrictor tone attenuates hydrostatic pressure effects on capillary pressure. Prolonged exercise time was achieved in 35 C water as a result of enhanced venous return because venous pooling due to gravity was avoided. M.S.K.

A82-16933 Effect of physical fitness and training on physiological responses to hypogravity. H. Saiki, M. Nakaya, M. Sudoh, M. Abe, Y. Taketomi, K. Oh'ishi (Jikei University, Tokyo, Japan), Y. Saiki, and A. Saiki (Saiki Institute of Science for Nutrition, Tokyo, Japan). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica*, vol. 8, Sept.-Oct. 1981, p. 959-969. 12 refs.

Athletes, quasi-athletes, and nonathletes were studied after periodic exercise and immersion in a water tank to determine the effects of hypogravity on physical fitness. Changes in VO2 flux, anaerobic power and flicker fusion value, blood pressure and pulse rate, urinary excretion of K(+), Na(+), 17-OHCS, and catecholamines were measured every hour for six hours. Orthostatic tolerance (OST) increased after exercise and decreased after immersion. An observed increase in pressure regulation functions was taken as an adaptation to the decrease in tolerance of other functions, creating a favorable condition for hypodynamic life. Water immersion helped the recovery of tolerance losses and did not create stress. However, a relatively small noradrenaline decrease, and a smaller adrenaline increase, were taken as evidence of detrimental effects of hypodynamics for athletes. M.S.K.

A82-16934 Simulation of human reactions under extreme conditions. H. Felkel, M. Jirina, M. Adamec, R. Feuereisl, J. Dvorak, and L. Cettl (Vyzkumny Ustav Tuberkulozy a Respiracnich Nemoci, Prague, Czechoslovakia). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica*, vol. 8, Sept.-Oct. 1981, p. 971-976.

A heuristic model of the lung flow-volume loop for lung mass determination is presented. The redistribution and transfer of fluids in weightlessness affects lung blood flow, and computer analysis and simulation was used to mathematically describe breathing dynamics. Second order parameters were identified and model calculations were compared to results derived from esophageal sounds made by 20 random individuals. A correlation of 0.603 was found, and in-flight measurement of the relative blood volume in the lungs in weightlessness is projected to be possible using a pneumotachograph. M.S.K.

A82-16935 * An overview of the endocrine and metabolic changes in manned space flight. C. S. Leach (NASA, Johnson Space Center, Biomedical Laboratories, Houston, TX). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica*, vol. 8, Sept.-Oct. 1981, p. 977-986. 31 refs.

Analyses of endocrinological and metabolic data from humans during spaceflight, particularly the Skylab crews, are summarized to define the levels of knowledge of these processes and the techniques for studying them. The glomerular filtration rate was tested by urine and blood samples, yielding indications of a creatinine clearance increase. The mechanisms for an increase of free water clearance, implying an increase of antidiuretic hormone, are uncertain, and tests are also under way to evaluate the role of prostaglandins in-flight, to account for decreases in catecholamine excretion. Bone mineral losses of 7.9% were observed at the end of 84 days, and processes are suggested for the calcium metabolism. Finally, the observation of almost universal weight loss among space crewmembers is examined, and a loss of muscle tone due to decreased metabolic efficiency is cited as a feature of long duration spaceflight. M.S.K.

A82-16936 Ion regulatory function of the human kidney in prolonged space flights. A. I. Grigor'ev (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica*, vol. 8, Sept.-Oct. 1981, p. 987-993. 14 refs.

Ten cosmonauts, who performed 30-175-day space flights aboard Salyut-4 and Salyut-6, and over 60 test subjects who were exposed to bed rest of up to 182 days and immersion of up to 56 days, were examined. The renal excretion of potassium and calcium increased, reaching a maximum by the 4-6th weeks in prolonged space flights and simulation studies. During the load tests with potassium and calcium salt, excretion postflight was much higher than preflight. During potassium chloride load tests a positive correlation between the blood content of aldosterone and potassium excretion existed, whereas during calcium lactate load tests an increased calcium excretion was accompanied by a decrease in blood parathyroid hormone concentration. The most probable cause of the negative ion balance in weightlessness is the reduced capacity of tissues to retain electrolytes due to the decreased ion pool capacity. Different exercises have been shown to exert a beneficial effect on electrolyte metabolism. (Author)

A82-16937 Hematological and immunological changes during space flight. A. Cogoli (Zürich, Eidgenössische Technische Hochschule, Zurich, Switzerland). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica*, vol. 8, Sept.-Oct. 1981, p. 995-1002. 28 refs. Swiss National Science Foundation Grant No. 3,449,0,79.

This paper gives a summary of the principal hematological and immunological changes observed in crews after space flight. Reduction of red blood cell mass (2-21%) and of hemoglobin mass (12-33%) is generally observed. The changes are accompanied with a loss of plasma volume (4-16%). Erythrocyte and hemoglobin concentrations in the blood remain constant, suggesting that the changes are driven by a feed-back mechanism. Immunological changes consist mainly of reduced T-lymphocyte reactivity. The results of the 96-day and 140-day Salyut-6 missions suggest that the adaptation of the immune system to spaceflight occurs in two stages: the first takes place during the first 2-3 months in space, the second

follows and consists of further weakening of the immune response. Experiments with human lymphocytes in vitro indicate that high-g enhance, whereas low-g depress lymphocyte activity. Finally, investigations to be performed on Spacelab are described. (Author)

A82-16938 Nausogenic properties of various dynamic and static force environments. R. J. von Baumgarten, H. Vogel, and J. R. Kass (Mainz, Universität, Mainz, West Germany). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 1005-1013. 9 refs. Bundesministerium für Forschung und Technologie Contract No. 01-QV-017-ZA/WF/WRK-2755.

Tests to define the exact nature of space sickness are described. Static space sickness is thought to occur in individuals who lack perfect symmetry in their otoliths. Orientation imbalance is then precipitated by a change to a hypogravity field. Dynamic space sickness can happen in persons who are not affected by static space sickness, and involves displacement of the otoliths by inertial forces during head movements and locomotion. Experiments in cars, airplanes, and on a laboratory sled to explore the susceptibility to motion sickness are outlined. It was observed that humans have sensors for acceleration, but not for velocity, and velocity- and hill-top illusions are mentioned, noting that changes in direction or acceleration led to subjects perceiving up and down motions while in fact they were riding in a horizontal path. Symptoms vanished with visual contact with the environment. M.S.K.

A82-16939 * Coping with space motion sickness in Spacelab missions. A. Graybiel (U.S. Naval Aerospace Medical Center, Aerospace Medical Research Laboratory, Pensacola, FL). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 1015-1018. 7 refs. NASA Order T-3384-G.

Lessons learned from Skylab are applied to methods of dealing with space sickness among crewmembers in their first orbital flight. Early experiences on Skylab 3 led to regularly scheduled scopalamine/dexedrine tablets ingestion. Subsequent experiences on the next Skylab mission established a 75% incidence of the sickness among first-time-in-orbit crewmembers, notably in periods of inactivity rather than work periods. Intramuscular injections are recommended to treat acute space sickness. Preflight transdermal scopalamine plus three or four doses of 5 mg amphetamine are chosen preventive measures, giving 12 hours of efficacy. M.S.K.

A82-16940 Status of vestibular function after prolonged bedrest. M. Burgeat, M. Toupet, D. Loth, I. Ingster (Hôpital Lariboisière, Paris, France), A. Guell, and J. Coll (Hôpital de Rangueil, Toulouse, France). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 1019-1927. 7 refs. Research supported by the Centre National d'Etudes Spatiales.

Six young, healthy, male volunteers were submitted to one week of head down (-4 deg) bedrest. This position simulates the cerebral hemodynamic conditions in weightlessness. Measurements of vestibular equilibrium and of oculomotor system function were made before and after the prolonged bedrest. Analysis of the results indicates that vestibular responses, as measured by the maximal speed of the slow phase of the provoked nystagmus (caloric and sinusoidal rotary stimulations), are decreased after prolonged bedrest. This statistically significant diminution requires confirmation with a greater number of cases. The reflex conflicting or interacting with the cervico-ocular and optokinetic reflexes on the one hand and the foveal vision on the other, is one of several possible explanations for the observed changes. (Author)

A82-16941 Vestibular tests in the selection of cosmonauts. J. Kubiczkowa (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 1029-1034. 14 refs.

Results of the testing of cosmonaut candidates for susceptibility to space sickness caused by Coriolis accelerations are reported. The tests comprised biothermal caloric, rotary acceleration-deceleration, optokinetic, swing torsion, and statokinesemetric trials. Nystagmus parameters were obtained from the caloric and rotary tests, and were found similar for subjects with high tolerances for Coriolis accelerations. It is noted that vestibular habituation did not occur evenly for all subjects, and further tests to determine the exact physical mechanisms which lead to reduced response to motion sickness are recommended. M.S.K.

A82-16942 * Effects of the diet on brain function. J. D. Fernstrom (MIT, Cambridge, MA). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 1035-1042. 19 refs. NASA-NIH-PHS-supported research.

The rates of synthesis by brain neurons of the neurotransmitters serotonin, acetylcholine, and the catecholamines depend on the brain levels of the respective precursor molecules. Brain levels of each precursor are influenced by their blood concentration, and for the amino acid precursors, by the blood levels of other amino acids as well. Since diet readily alters blood concentrations of each of these precursors, it thereby also influences the brain formation of their neutrotransmitter products. (Author)

A82-16943 Informational need of emotional stress. P. V. Simonov and M. V. Frolov (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 1043-1049. 9 refs.

Subjects underwent a series of tests comprising a visual recognition of numbers in the presence of visual noise and time constraints to measure the influence of emotional stress on reactions. Small levels of continued emotional stress were found to increase performance, decrease errors, and also lead the operators to regard unimportant cues as important. A hypothalamus-amygdala model is presented, where motivational conflict induces chronic anxiety and fixed-direction actions. Further personality typing is attempted with models of hypothalamus-frontal cortex dominated individuals, who are predominantly introverts or choleric, and amygdala-hippocampus dominated persons, who are weak or melancholic. Additionally, there are frontal-cortex-hippocampus dominated individuals who display extroverted behavior. M.S.K.

A82-16944 How important are changes in body weight for mass perception. H. E. Ross (Stirling, University, Stirling, Scotland; Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bonn, West Germany). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 1051-1058. 26 refs.

The ability of humans to judge weight and mass in variable gravity conditions is considered. Subjects have compared weights and masses in and out of water, in parabolic flight and on the ground, and in centrifuges. Differences in the arm weight due to reduced gravity was found to lead to a choice of weights and masses greater than those in normal gravity. Sequencing the magnitude of the objects also displayed significant effects, as did the presence of anxiety, unusual vestibular stimulation, cognitive expectations, and range effects. Adaptation to null gravity results in an improvement in judgment of the mass of familiar objects, called 'mass constancy', and maladjustment returns with a return to a different gravity environment. M.S.K.

A82-16945 Pathophysiology of motor functions in prolonged manned space flights. I. B. Kozlovskaia, Iu. V. Kreidich, V. S. Oganov, and O. P. Koserenko (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 1059-1072. 14 refs.

The influence of weightlessness on different parts of the motor system has been studied in crew members of 140- and 175-day space flights. It has been shown that weightlessness affects all parts of the

motor system including: (1) the leg and trunk muscles, in which severe atonia, a decrease of strength and an increase of electromyographic cost of contraction have been observed; (2) the proprioceptive elements and the spinal reflex mechanisms in which decreased thresholds accompanied by decreases of maximal amplitude of reflexes and disturbances in cross reflex mechanisms have been found; and (3) the central mechanisms that control characteristics of postural and locomotor activities. The intensities and durations of disturbances of different parts of the motor system did not correlate to each other, but did correlate with prophylactic activity during space flight. The data suggest a different nature of disturbances caused by weightlessness in different parts of the motor system.
(Author)

A82-16946 The effects of hypokinesia in primates and bone strength. L. E. Kazarian and H. E. von Gierke (USAF, Aerospace Medical Research Laboratories, Wright-Patterson AFB, OH). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 1075-1082.

A 14 days ground based primate hypokinesia investigation was conducted to determine what changes, if any, in bone strength may be demonstrated following 2 weeks cast immobilization and at 14 days after removal from casts. Controlled compressive loads were applied to vertebral bodies excised from control, 2 weeks immobilization and 2 weeks post immobilization Rhesus monkeys. The material properties reported herein are ultimate load, displacement to ultimate load, stiffness, and energy to ultimate loads. These results show a decrease in bone strength following immobilization and a still further decrease in bone strength after 14 days. (Author)

A82-16947 Bone effects of space flight - Analysis by quantum concept of bone remodelling. A. M. Parfitt (Henry Ford Hospital, Detroit, MI). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 1083-1090. 25 refs.

The long term effects and extent of bone calcium loss due to long duration spaceflight are examined. The calcium loss is mainly through urinary excretion, according to Skylab IV data, with a maximum loss rate of 300 mg/day. The total average depletion was 18 g from both trabecular and cortical bones, and the extent of recovery after return to earth is as yet undetermined. Bone remodelling in natural processes involves osteoclast excavation of bone cavities and osteoblast renewal, with complete erosion and repair cycles lasting 3-6 months. An example of deer antler regrowth is cited, wherein increased cortical bone porosity occurs during regrowth, then returns to normal after the antlers are completed. Finally, tetracycline labeling of bone formation sites is reviewed, and it is cautioned that results of studies of bone regrowth for long term bedrest subjects may not be applicable for long term spaceflight.
M.S.K.

A82-16948 Radiation - Risk and protection in manned space flight. V. M. Petrov, E. E. Kovalev, and V. A. Sakovich (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 1091-1097. 15 refs.

Radiation hazard for cosmonauts and necessary protective measures are considered. The radiation is either permanent, such as in the inner terrestrial radiation belts, or temporary, such as in the fluctuating outer belts, from solar flares, or from cosmic ray showers. An effective level of 33 rem is offered as a justified risk dose, based on U.S.S.R. and international safety standards. Estimated radiation levels are provided for a one year spaceflight, noting that exposures to 50 rem doses should be more than one month apart. Increased orbital inclination, lengthy flight duration, and higher orbits all lead to increased radiation risks, and shielding with aluminum to 5 g/sq cm is recommended, along with a radiation shelter for long term workers on space stations. The calculated permissible dose rates are designed to bring the probabilities of death due to tumors caused by radiation in line with hazards faced in other occupations, such as test pilots.
M.S.K.

A82-16949 The role of HZE particles in space flight - Results from spaceflight and ground-based experiments. H. Bücker and R. Facius (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Frankfurt am Main, West Germany). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 1099-1107. 19 refs.

Selected results from experiments investigating the potentially specific radiobiological importance of the cosmic HZE (equals high Z, energetic) particles are discussed. Results from the Biostack space flight experiments, which were designed to meet the experimental requirements imposed by the microdosimetric nature of this radiation field, clearly indicate the existence of radiation mechanisms which become effective only at higher values of LET (linear energy transfer). Accelerator irradiation studies are reviewed which conform with this conjecture. The recently discovered production of 'microlesions' in mammalian tissues by single HZE particles is possibly the most direct evidence. Open questions concerning the establishment of radiation standards for manned spaceflight, such as late effects, interaction with flight dynamic parameters, and weightlessness, are indicated. (Author)

A82-16950 Anesthesia, surgical aid and resuscitation in manned space missions. L. L. Stazhadze, I. B. Goncharov, I. P. Neumyvakin, V. V. Bogomolov, and I. V. Vladimirov (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 1109-1113.

Medical procedures suitable for employment in space are reviewed. Reduced blood volume, the redistribution of bodily fluids, dehydration, functional hypodynamics of the myocardium, and shifts in the central or humoral parts of hemodynamic regulation have been noted in long duration space flights. The use of mutually potentiating subnarcotic anesthesia is mentioned, as well as electroanalgesia, reflexotherapy, auriculoacupuncture, and peridural anesthesia, which leaves possibilities of continued operator functioning. Conditions requiring surgery are examined, noting that decreased immunoreactivity observed among cosmonauts will necessitate gnotobiological chambers and specially designed surgeon's tools. The dangers inherent in brain edema in space during resuscitation, emergency infusion-transfusion therapy, and the existence of procedures for use in life threatening situations during extravehicular activity are indicated. M.S.K.

A82-16951 Biomedical aspects of artificial gravity. A. A. Shipov, A. R. Kotovskaia, and R. R. Galle (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 1117-1121. 17 refs.

Results of ground-based biomedical investigations of artificial gravity and flight experiments on the Soviet biosatellites Cosmos 782 and 936 are presented. The goal of the investigations was to determine the minimum efficient value of artificial gravity in long-term flights which may eliminate adverse effects of prolonged weightlessness. The development of methods to increase human tolerance to a rotating environment is given highest priority. The maximum angular velocity is determined to be 6 rpm, and the minimum level of the force of gravity is 0.3 g, with a radius of rotation of 10 m. D.L.G.

A82-16953 Trends in space life support. A. I. Skoog (Dornier System GmbH, Friedrichshafen, West Germany) and A. O. Brouillet (United Technologies Corp., Hamilton Standard Div., Windsor Locks, CT). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 1135-1146. 5 refs.

Trends in the development of candidate physico-chemical components for use in regenerative life support systems for future extended-duration-mission spacecraft are discussed. The development of life support systems which provide air revitalization, including

CO2 reduction, water reclamation, and limited waste management will require a two-fold approach due to complexities associated with the biological support systems. For longer duration manned space flights, such as permanently inhabited space stations, it is recognized that development of biological life support systems capable of generating food and regenerating wastes will be essential to reduce logistics costs. D.L.G.

A82-16954 Future investigations onboard Soviet biosatellites of the Cosmos series. E. A. Il'in (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 1149-1157. 16 refs.

Rat experiments on Cosmos biosatellites have been conducted to furnish information concerning the effects of weightlessness, artificial gravity, and ionizing radiation combined with weightlessness on structural and biochemical parameters of animal bodies. Investigations of weightlessness effects on the cardiovascular and vestibular systems, higher nervous activity, skeletal muscles, and biorhythms of two rhesus monkeys are currently being developed and tested. A study of weightlessness effects on embryogenesis of rats and bioenergetics of living systems on the Cosmos biosatellites is also planned. Physiological investigations of non-human primates will be emphasized in future Soviet flight programs, with high priority given to cardiovascular function, fluid-electrolyte metabolism, interaction of sensory systems, and the musculo-skeletal system. D.L.G.

A82-16955 Human roles in future space operations. D. R. Criswell. *(International Academy of Astronautics, International Symposium on Basic Environmental Problems of Man in Space, 6th, Bonn, West Germany, Nov. 3-6, 1980.) Acta Astronautica,* vol. 8, Sept.-Oct. 1981, p. 1161-1171. 45 refs. Research sponsored by the University of California.

Man's development in the biosphere from a competitor with other animals to a controller of mass flows equal to those of the biosphere is reviewed. The fundamental physical reasons for man's expansion into space are then considered: (1) more efficient equipment for conversion of solar energy into useful energy; (2) ability to handle progressively larger quantities of matter in more capital-efficient ways; (3) unlimited space within which to build new cumulated controlled connectivities (C + C + C) centers and (4) construction of environments within which decay of productive and accumulated capital can be minimized. Finally, several near-term and long-range research topics appropriate to human expansion into space are reviewed, including space stations, mixed crews, extended missions, and space colonies. J.F.

A82-16968 † Characteristics of loading hypoxia (Osobennosti gipoksii nagruzki). M. M. Filippov (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 27, Nov.-Dec. 1981, p. 753-757. 13 refs. In Russian.

The physiological changes accompanying the oxygen insufficiencies present in the body during exercise are investigated. Determinations of respiratory, hemodynamic and gas exchange indicators, measurements of blood gas composition and acid-base status, and analyses of oxygen and carbon dioxide metabolism were performed for over 300 individuals of various ages and degrees of physical training at rest and during muscular activity at sea level and in the mountains. Loading hypoxia is found to be characterized by venous hypoxemia and hypercapnia, oxygen deficiency or oxygen debt at high levels of exertion, the build-up of underoxidized metabolites, and shifts in the acid-base status of the blood and blood buffering capacity, affecting the oxygen affinity of hemoglobin. The hypoxic state is also found to be accompanied by greater respiratory and circulatory system efficiency. Four stages of loading hypoxia are distinguished according to the degree of expression and the results of compensatory mechanisms. A.L.W.

A82-16969 † Oxygen tension in albino rat abdominal cavity organs in normo- and hyperoxybaria (O napriazhenii kisloroda v nekotorykh organakh briushnoi polosti belykh kris pri normo- i giperoksibarii). I. F. Sokolianskii (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 27, Nov.-Dec. 1981, p. 758-761. 16 refs. In Russian.

The relation of the partial pressure of oxygen in the external medium to that in the liver, kidney, intestinal seromuscular layers and mucosal layer in the rat is investigated. Experiments were performed on animals exposed to oxygen partial pressures from 20 to 392.2 kPa, with tissue oxygen measured polarographically in room air, normobaric hyperoxia and hyperbaric hypoxia. The increase in oxygen partial pressure is reflected to varying degrees as an increase in the oxygenation of the various organs and tissues examined. At a hyperoxybaria of 392.2 kPa, the oxygen tension in the seromuscular layer of the intestines and the liver is observed to be maintained at a high level for as long as 120 min, although the peak in tension occurs before the end of this period. A.L.W.

A82-16970 † The state of the air-blood barrier in hyperoxia (Sostoianie aero-gematicheskogo bar'era pri giperoksii). T. N. Kovalenko (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 27, Nov.-Dec. 1981, p. 762-767. 15 refs. In Russian.

The effects of short-term exposure to hyperoxia on the ultrastructure and thickness of the pulmonary air-blood barrier and the surface tension of pulmonary tissue extracts are examined in adult and 2-week-old rats breathing gas mixtures of from 40 to 90% O2 for 30 min. Signs of the nonuniform deterioration of the air-blood barrier are found in rat lung following the breathing of 90% O2 in nitrogen which are more pronounced and more frequent in the young animals. These degradations are accompanied by changes in pulmonary microcirculation, a thickening of the air-blood barrier, and an increase in pulmonary surface tension in the young rats only. The breathing of 40% O2 mixtures is not found to lead to any changes in these parameters in either age group. Results thus demonstrate the potential for damage of extended exposure to 90% oxygen mixtures, and the greater sensitivity of the organism to the effects of hyperoxia at the early stages in its development. A.L.W.

A82-16971 † Some characteristics of thermal adaptation in small laboratory animals (O nekotorykh osobennostiakh teplovoi adaptatsii melkikh laboratornykh zhivotnykh). V. A. Lekakh, O. N. Lagunova, and M. L. Khalin (Donetskii Meditsinskii Institut, Donetsk, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 27, Nov.-Dec. 1981, p. 819-822. 12 refs. In Russian.

The applicability of the characteristics of thermal adaptation and tolerance observed previously in the rat to other types of small laboratory animals is investigated in heat acclimatization experiments involving guinea pigs. The experiments involved twice-weekly exposures of the animals to a temperature of 42 C for a period of 1 hour, followed by the evaluation of tolerance times at the same temperature. As with rats, the guinea pigs are found to exhibit a plateau in body temperature upon exposure to heat, the duration of which may be used to evaluate heat tolerance, although that of the guinea pig may reach 42.2-42.4 C, compared to the rat's 41.6-41.8 C. Heat training is observed to extend the length of this plateau period in most animals, although it has no significant effect on the rate of body temperature change or its plateau level. Considerable individual variability in adaptive capacities is also observed, however a significant correlation is found between the rate of temperature reduction in the recovery period and the extent of thermal tolerance increase in the training period. A.L.W.

A82-17123 Experimental biology and medicine in space. Iu. G. Grigor'ev (Ministry of Health of USSR, Institute of Biophysics, Moscow, USSR). *Endeavour,* vol. 5, no. 4, 1981, p. 147-151. 20 refs.

The progress of spaceborne biological studies is reviewed. Early long duration flights such as Cosmos-110 and Zond-7 returned dogs and tortoises in healthy conditions, while muscular atrophy, a decrease in muscle strength, and osteoporosis were observed on rats onboard Cosmos satellites. Cosmos-782 demonstrated the worth of centrifugal inducement of one-third g to maintain normal physiological processes. Drosophilae onboard Bios II displayed lethal mutations, cross-overs, and multiple chromosome breaks in larval reproductive cells from space gamma radiation. The deceleration of heavy nuclei is estimated to irradiate 15,000 cells with several thousand rads, a level which can significantly affect highly differentiated cells. Plants have been found to require gravity for growth, while

weightlessness does not affect processes which are not dependent on gravity, such as mammalian growth. M.S.K.

A82-17133 Robot with sense of touch (Roboter mit Tastsinn). G. Hirzinger (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Dynamik der Flugsysteme, Oberpfaffenhofen, West Germany). *DFVLR-Nachrichten,* Nov. 1981, p. 38-41. In German.

A description is presented of investigations related to the development of computer-controlled manipulators (robots) with touch-sensor feedback systems, taking into account work conducted in West Germany. A robot is concerned with emulating the functions of the human arm. It has, therefore, a number of joints which can be individually controlled. Many of the current robots cannot yet be programmed for the Cartesian space to which man has become accustomed. A system of computer programs was developed for the calculation of the data needed by the robot to execute the required motions. Attention is also given to a three-dimensional force-moment sensor, two alternate approaches for the sensor signal feedback system, and robot languages. Applications involving an employment of the touch sensor are also discussed, taking into account the trimming of cast-metal components and assembly operations. G.R.

A82-17138 † An investigation of memory during the process of adaptation to mountain conditions (Issledovanie pamiati v protsesse adaptatsii k usloviiam vysokogor'ia). V. D. Bakharev (Voenno-Meditsinskaia Akademiia, Leningrad, USSR). *Fiziologiia Cheloveka,* vol. 7, Nov.-Dec. 1981, p. 963-969. 8 refs. In Russian.

Changes in verbal memory arising during the period of human adaptation to mountain conditions are investigated. Residents of Central Asia and Pskov were tested for visual, short-term, long-term, operative, visual shape, associative, involuntary and auditory memory during stays on the plains and in the Pamir mountains at an altitude of 3400-3600 m. Reductions in all memory indicators of 10-20%, and in some cases 30%, are found during the initial period of altitude adaptation, with the peak in memory decline occurring at the end of the second day at altitude. By the 7-8th day of adaptation, the indicators of memory are restored to levels close to the original, however do not reach control levels even after 50 days. The worsening of memory is less pronounced in the residents of Central Asia than in residents of the central region, while heavy physical loads are observed to have a negative influence on memory and mental capacity. Finally, it is found that the neuromodulator (8-arginine)-vasopressin improves human memory, particularly under mountain conditions. A.L.W.

A82-17139 † The circadian organization of the circulatory and respiratory systems of Antarctic workers (Tsirkadnaia organizatsiia sistem krovoobrashcheniia i dykhaniia u poliarnikov v Antarktide). V. A. D'iachkov (Akademiia Meditsinskikh Nauk SSSR, Novosibirsk, USSR) and M. P. Moshkin (Kuzbasskii Politekhnicheskii Institut, Kemerovo, USSR). *Fiziologiia Cheloveka,* vol. 7, Nov.-Dec. 1981, p. 970-973. 17 refs. In Russian.

A82-17140 † Pulmonary diffusing capacity under conditions of restricted motor activity (Diffuzionnaia sposobnost' legkikh v usloviiakh ogranichennoi dvigatel'noi aktivnosti). N. A. Agadzhanian and A. N. Kotov (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Fiziologiia Cheloveka,* vol. 7, Nov.-Dec. 1981, p. 974-980. 18 refs. In Russian.

The dynamics of pulmonary diffusing capacity and its membrane and capillary components are investigated in humans under conditions of prolonged motor activity restriction. Steady-state determinations of pulmonary diffusing capacity were made in subjects undergoing 49 days of strict antiorthostatic hypokinesia, strict antiorthostatic hypokinesia while exposed to hypoxic gas mixtures for a period of 3 hours twice daily, and antiorthostatic hypokinesia while performing physical exercises for a period of 1 hour twice daily. An initial increase, followed by a decrease to below original values then a reestablishment of the original level of pulmonary diffusion capacity is found which is indicative of blood redistribution. The breathing of hypoxic gas mixtures or the performance of exercises as prophylactic measures is observed to have no effect on the dynamics of diffusing capacity variations, however it tends to diminish the markedness of shifts and their duration. These prophylactic measures are also observed to maintain a high degree of correlation between diffusing capacity and respiratory volume. A.L.W.

A82-17141 † Monitoring the condition of the organism under hyperoxic conditions (Kontrol' sostoianiia organizma v usloviiakh giperoksii). A. I. Selivra (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR), I. F. Sapozhkova (Ministerstvo Vysshego i Srednego Spetsial'nogo Obrazovaniia SSSR, Osoboe Konstruktorskoe Biuro Biologicheskoi i Meditsinskoi Kibernetiki, Moscow, USSR), and A. M. Rafikov (Nauchno-Issledovatel'skii Neirokhirurgicheskii Institut, Leningrad, USSR). *Fiziologiia Cheloveka,* vol. 7, Nov.-Dec. 1981, p. 981-989. 15 refs. In Russian.

A method is developed for the on-line processing of EEG data to obtain early indications of the onset of acute oxygen intoxication in patients undergoing hyperoxic treatments. The method, which provides for the spectral analysis of EEGs, is applied to data obtained in the monitoring of patients with either permanent injuries to the peripheral nervous system without brain pathology or vascular or traumatic brain injuries during hyperbaric oxygenation at oxygen partial pressures from 130 to 297 kPa. Early signs of the breakdown of the hyperoxia compensation in healthy people are found to include the appearance of slow rhythms in the EEG, the reduction in the amplitude of pneumogram respiratory waves, and the appearance or amplification of respiratory arrhythmias in the pulse. The algorithm finally adopted for the prediction of acute oxygen intoxication calculates the contracted modular shape coefficient of the EEG, and becomes most effective during a voluntary hyperventilation maneuver. In the case of patients with initially disturbed EEG patterns, it is recommended that EEG norms be obtained during the first few minutes of hyperoxic treatment to be used as standards for the remainder of the exposure. A.L.W.

A82-17142 † The effects of operator activity on the diurnal rhythm of physiological functions (Vliianie operatorskoi deiatel'nosti na sutochnuiu ritmiku fiziologicheskikh funktsii). V. V. Romanov and A. N. Popov (Kalininskii Politekhnicheskii Institut, Kalinin, USSR). *Fiziologiia Cheloveka,* vol. 7, Nov.-Dec. 1981, p. 990-995. 15 refs. In Russian.

The effects of operator activity of various types on the daily rhythms of body temperature and cardiovascular indicators are investigated. Measurements of the daily variation in body temperature, pulse rate, arterial pressure at rest and after physical loading were made in 441 operators working uninterrupted for 6 or 12 hours or in an expectation regime for 24 hours. Increased operator workloads are found to lead to a significant decrease in the amplitudes of the daily oscillations of body temperature and cardiovascular indicators, while mean daily body temperature is unchanged and heart rate is somewhat decreased. Decreases in body temperature and heart rate at the end of the working shift are attributed to the limited motor activity involved in operator tasks. It is suggested that, rather than the absolute values or changes in pulse rate or arterial pressure, a circulatory effectiveness coefficient measured during a functional test be used to assess operator fatigue. A.L.W.

A82-17143 † Northern pulmonary arterial hypertension (Severnaia legochnaia arterial'naia gipertenziia). A. P. Milovanov, B. V. Noreiko, and G. I. Moroshnichenko (Akademiia Meditsinskikh Nauk SSSR, Moscow; Blagoveshchenskii Meditsinskii Institut, Blagoveshchensk, USSR). *Fiziologiia Cheloveka,* vol. 7, Nov.-Dec. 1981, p. 996-1003. 9 refs. In Russian.

The development of pulmonary artery hypertension in persons exposed to conditions of the far north over extended periods of time is investigated. Zonal measurements of blood pressure in the pulmonary circulation were made for 252 healthy male inhabitants of Pevek on the Arctic coast of the northeastern Soviet Union, Nar'ian-Mar in the polar region of the European north, and the Nenetsk autonomous okrug as a function of length of stay in their respective regions. Comparison with a control group examined at Blagoveshchensk in the winter reveals three stages of pulmonary hypertension in the northern inhabitants. The first stage, apparent after 3-12 months, is characterized by a threefold rise in pulmonary arterial pressure with an insignificant increase in systemic circulation. The second stage, lasting from the first to the tenth year of exposure, is marked by a decrease and eventual stabilization of pulmonary

pressure at a level twice that of normal, which is observed in natives of the region and second and third generation colonists. After about 10 years of habitation in the north, pulmonary hypertension is again observed to increase, with a maximum in the lower lung regions, and to be accompanied by complaints of dyspnea during sudden changes in the weather, indicating partial pulmonary deadaptation. A.L.W.

A82-17144 † **Characteristics of indicators of cardiac rhythm in the norm and in mental maladjustment (Osobennosti pokazatelei serdechnogo ritma v norme i pri psikhicheskoi dezadaptatsii).** V. M. Vorob'ev and V. P. Chebakov. *Fiziologiia Cheloveka,* vol. 7, Nov.-Dec. 1981, p. 1004-1010. 11 refs. In Russian.

The interrelationships of cardiac rhythm indicators in the norm and in persons with different degrees of mental maladjustment are compared. Computerized processing of electrocardiographic data was used to determine the correlations between indicators of cardiac rate, quality and reactivity to orthostatic tests, clinostatic tests, mental workloads and rest following physical loads in military school candidates with completely normal psychological characteristics, normal psychological characteristics with personality accentuations, and pathological maladjustments. The presence of a psychic maladjustment is observed to lead to a breakdown in the correlations between the various cardiac indicators, particularly between those of reactivity and quality. In addition, new correlations are also observed occasionally in cases of pathological psychologies which are not found in normal groups. Changes in the correlation relationships of cardiac rhythm indicators with varying degrees of mental adaptation are explained by general mechanisms for the regulation of mental and vegetative functions. A.L.W.

A82-17145 † **The effects of bicycle ergometer exercise on plasma amino acid contents in athletes (Vliianie veloergometricheskoi nagruzki na soderzhanie aminokislot v plazme u sportsmenov).** V. G. Kukes, A. S. Nasonov, L. P. Belianova, E. N. Golubeva, L. A. Baratova, A. M. Alaverdian, and A. B. Burkashov (I Moskovskii Meditsinskii Institut; Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Fiziologiia Cheloveka,* vol. 7, Nov.-Dec. 1981, p. 1011-1015. 18 refs. In Russian.

The effects of bicycle ergometer exercise to the limit on the contents of free amino acids in the blood plasma of elite athletes are investigated in a study of the contributions of amino acids to muscular energy metabolism. Amino acid analyses were performed on the blood of six biathlon competitors and eight skaters 15 min before and 3 min after bicycle ergometer exercise with stepwise increasing loads starting at 1 W/kg body weight. In the skaters, who were found to exhibit a greater work capacity, plasma alanine contents are observed to increase by 52.6% with respect to initial levels in the post-exercise phase, while the levels of the remaining amino acids and total amino acid quantities did not change significantly. The biathlon competitors, having performed a lesser amount of work, exhibited no significant change in individual amino contents or total free amino acids following exercise. The increase in alamine contents in the better-conditioned athletes is attributed to the glucose-alanine cycle in which alanine is synthesized by the transamination of pyruvate during glycolytic glucose oxidation in muscles. A.L.W.

A82-17146 † **The dynamics of cardiac rhythm parameters during work under various loads (Dinamika parametrov serdechnogo ritma vo vremia raboty s razlichnoi nagruzkoi).** L. A. Beliakova and V. A. Poliantsev (Moskovskii Meditsinskii Stomatologicheskii Institut, Moscow, USSR). *Fiziologiia Cheloveka,* vol. 7, Nov.-Dec. 1981, p. 1016-1022. 14 refs. In Russian.

Differences in the dynamics of cardiac activity indicators appearing with different work loads are investigated in air traffic controllers with different levels of experience. Cardiac intervallograms were obtained by a telemonitoring system for 24 controllers aged between 25 and 30 years during the course of morning and evening shifts of duration 6 and 7.5 hours, respectively, and compared with simultaneous work levels. The cardiac indicators found to undergo the greatest variations in the presence of constantly varying work loads include parameters such as heart rate, mean square R-R interval deviation, P,T peak amplitude and ST interval displacement. Heart rhythm is observed to stabilize under increased loads in the more experienced controllers, corresponding to a more optimal state for task performance. A stabilization of heart rhythm is observed in all controllers toward the end of the shift, indicative of sympathoadrenal activation. The technique of cardiac monitoring throughout the working shift is recommended as a means for the detection of possible cardiac pathology in the air traffic controller. A.L.W.

A82-17147 † **Plasma erythropoietins during training for hyperoxic conditions (Eritropoetiny plazmy v protsesse trenirovki k usloviiam giperoksii).** V. I. Voitkevich, A. M. Volzhskaia, and L. A. Korchinskii (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologiia Cheloveka,* vol. 7, Nov.-Dec. 1981, p. 1118-1120. 13 refs. In Russian.

A82-17360 † **'Hot spots' in the problem of the origin of life ('Goriachie tochki' v probleme proiskhozhdeniia zhizni).** L. M. Mukhin. In: The problem of the search for extraterrestrial civilizations. Moscow, Izdatel'stvo Nauka, 1981, p. 148-154. In Russian.

Areas presenting the most difficulty to the understanding of the origin of life are considered. The conditions present on the primitive earth are discussed, and probable siting of the nonequilibrium thermodynamic synthetic processes necessary for life in regions of underwater vulcanism and hydrothermal features is pointed out. The problems of the origin of protein synthesis in the absence of enzymes and the translation apparatus, and the evolution of the genetic code are then examined, and experimental evidence demonstrating the virtual identity of the mechanism of protein and nucleic acid synthesis over the course of 3.5 billion years is indicated. A possible sequence of events giving rise to the present system of template coding is then proposed which is based on protein self-assembly becoming associated with membrane-facilitated nucleic acid metabolism in protocells. A.L.W.

A82-17361 † **Prospects for the detection of interstellar biological molecules (Perspektivy obnaruzheniia mezhzvezdnykh biologicheskikh).** V. I. Slysh. In: The problem of the search for extraterrestrial civilizations. Moscow, Izdatel'stvo Nauka, 1981, p. 155-160. 10 refs. In Russian.

The possibilities of the existence of complex biological molecules in interstellar space and of the detection of such molecules by astronomical methods are discussed. Molecular data from radioastronomical observations and laboratory experiments is presented which demonstrates the possibility of the existence of the physical conditions and precursor molecules necessary for the formation of complex molecules such as amino acids and nucleotides in interstellar space. Possible spectroscopic and direct means for the detection of such molecules are then examined, and it is concluded that amino acids and the components of nucleic acids may be detected by radioastronomical methods, whereas the search for protein molecules and DNA is possible through the use of X-ray astronomy and direct sampling. A.L.W.

A82-17362 † **Organic compounds in space and the problem of the origin of life (Organicheskie soedineniia v kosmose i problema proiskhozhdeniia zhizni).** V. S. Strel'nitskii. In: The problem of the search for extraterrestrial civilizations. Moscow, Izdatel'stvo Nauka, 1981, p. 161-171. 20 refs. In Russian.

Results of the search for and investigations of organic compounds in astronomical objects are presented in view of the importance of such molecules for the origin of life. Studies of various types of organic compounds in meteorites and comets are reviewed, and detections of aliphatic and aromatic hydrocarbons, heterocyclic nitrogenous bases, sugars and amino acids in carbonaceous chondrites and of HCN and CH3CN in Comet Kohoutek are noted which confirm the possibility of organic synthesis in the protoplanetary nebula. The discovery and classification of interstellar molecules are then reviewed, and the types of objects in which they are found are indicated, including diffuse clouds, dark dust clouds, globules, molecular clouds and circumstellar envelopes. The possible universal character of the processes of pre-biotic chemical evolution is discussed. It is shown that the necessary build-up of substances necessary for the appearance of life in the Galaxy is occurring on a large scale, although it is emphasized that this is not necessarily evidence for the prevalence of life. A.L.W.

A82-17426 * Vestibular and oculomotor physiology; Proceedings of the International Meeting, New York, NY, September 22-25, 1980. *Meeting sponsored by the Barany Society, New York* Academy of Sciences, NASA, et al. Edited by B. Cohen (New York, City University, New York, NY). *New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981. 905 p.

Papers are presented showing recent progress in the understanding of the processing of visual and vestibular signals by the central nervous system to produce eye movements and postural responses. Specific topics include the directional sensitivity of hair cells to hair bundle deflection, the effects of gravity on rotatory nystagmus, the reticulovestibular organization associated with horizontal fast eye movement, the pathways controlling the extraocular eye muscles, the organization of visual-vestibular interaction in vestibular neurons, motion sickness due to vision reversal in stroboscopic light, and vestibular habituation during sinusoidal rotation. Attention is also given to vestibulo-ocular, vestibulocollic and cervicocollic reflexes, visual mossy fiber inputs to the flocculus, directional plasticity of the vestibulo-ocular reflex, the relation of active head rotation with eye-head coordination, instability in the optokinetic-vestibular system as an explanation for periodic alternating nystagmus, the effects of visual and nonvisual fixation on vestibular systagmus, interaction of saccades with the vestibulo-ocular reflex, and the role of the plantar mechanoreceptor in equilibrium control. A.L.W.

A82-17427 Directional sensitivity of individual vertebrate hair cells to controlled deflection of their hair bundles. S. L. Shotwell, R. Jacobs, and A. J. Hudspeth (California Institute of Technology, Pasadena, CA). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 1-10. 12 refs. Research supported by the William Randolph Hearst Foundation, Ann Peppers Foundation, and Pew Foundation; Grants No. NIH-NS-13154; No. NIH-GM-00086.

Observations of the directional sensitivity of individual vertebrate sensory hair cells to displacements of their hair bundles are reported. Experiments were performed by the mechanical stimulation of the hair bundles at the apical ends of hair cells of bullfrog saccular maculi by fine glass capillaries slipped over the distal ends of the bundles, simultaneously with the recording of intracellular receptor potential. Deflection of the tip of the hair bundle within the hair cell plane of symmetry is observed to produce a graded depolarization of amplitude 4-20 mW when the motion is towards the kinocilium, and a graded hyperpolarization of about one fifth this magnitude when the motion is in the opposite direction. Stimulation in the plane perpendicular to the hair cell plane of symmetry produces little or no receptor potential, while stimulation in an intermediate direction produces a response that varies approximately as the cosine of its angle to the symmetry axis. Results suggest that the directional sensitivity of the hair bundle is conferred by the differing heights of the stereocilia along the plane of symmetry. A.L.W.

A82-17428 The function of the endolymphatic duct - An experimental study using ionic lanthanum as a tracer: A preliminary report. H. Rask-Andersen, G. Bredberg, L. Lyttkens, and G. Loof (University Hospital, Uppsala, Sweden). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 11-19. 23 refs. Research supported by the Statens Medicinska Forskningsrad. SMF Project 3542; SMF Project 3908.

A82-17429 Eye-muscle geometry and compensatory eye movements in lateral-eyed and frontal-eyed animals. J. I. Simpson and W. Graf (New York University, New York, NY). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 20-30. 51 refs. Research supported by the Irma T. Hirsche Trust; Deutsche Forschungsgemeinschaft Contract No. Gr-688/1; Grant No. PHS-NS-13742.

The basis for the differences in the directions of compensatory eye movements in lateral-eyed and frontal-eyed animals is investigated by the determination of the orientations of the vertical semicircular canals and the insertions and lines of action of the oblique and vertical recti muscles in species with differing interocular angles. Muscle and vestibular orientations and muscle actions were measured or obtained from the literature for pigmented and albino rabbits, albino guinea pigs, and pigmented cats,, and compared with the literature data for humans. The pulling directions of the superior oblique and superior rectus muscles are found to change relative to the optic axis so that the ipsilateral vertical canal to which each muscle is most nearly parallel remains the same. Changes in the insertion points of the superior muscles on the ocular globe combine with the changes in lines of action to produce different secondary kinematic actions leading to different types of compensatory eye movements upon exposure of the semicircular canals to rotational stimuli. A.L.W.

A82-17430 Phasic components of frog semicircular canal. Y. Harada and K. Hirata (Hiroshima University, Hiroshima, Japan). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 31-39. 7 refs.

The sensory adaptation characteristics of the ampulla of the isolated frog semicircular canal are investigated. Vertical posterior semicircular canals isolated together with their ampullas and the distal stump of the ampullar nerve were stimulated by a mechanical device inducing ampullofugal currents, and the induced action potentials in the ampullar branch of the vestibular nerve were recorded. Observations of the time course of nerve activity indicate that the integrated nerve activity recorded reflects mainly the high-amplitude action potentials. Maximum values of the integrated nerve activity are found to be proportional to the logarithm of stimulus strength, and to the displacement velocity of the mechanical stimulation. When a fluid flow pulse of long duration is applied to the canal, integrated nerve activity is found to decrease exponentially during a single pulse, and to decrease with successive pulses less than 5.0 sec apart. Finally, experiments with superimposed sequential stimulation applied at various times indicate the presence of adapting units with different thresholds. A.L.W.

A82-17431 * Physiological mechanisms of the nystagmus produced by rotations about an earth-horizontal axis. J. M. Goldberg and C. Fernández (Chicago, University, Chicago, IL). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 40-43. 14 refs. Grants No. NIH-NS-01330; No. NGR-14-001-225.

The physiological basis of the nystagmus produced by rotation about an earth-horizontal axis is investigated with particular emphasis on the unidirectional nystagmus attributed to a bias component. Eye movement recordings were made with dc electro-oculography in alert squirrel monkeys and afferent responses were recorded from semicircular canals and otolith receptors of anesthetized animals upon rotations in the pitch and yaw planes. The eye-movement recordings show the rotation responses in the squirrel monkey to resemble those of other species, including persistent horizontal and vertical nystagmuses during yaw and pitch rotations, respectively, a unidirectional nystagmus at low rotation speeds, and postrotatory responses of relatively small amplitude and duration. The vestibular nerve recordings do not show a directionally specific dc response that can account for the bias component, but instead exhibit sinusoidal responses of peak amplitudes 0-15 and 25-75 spikes/sec for the canals and otolith, respectively. Results thus indicate that the dc signal to the oculomotor centers responsible for the nystagmus is of central origin, most likely based on some transformation of the otolith signals. A.L.W.

A82-17432 Effects of gravity on rotatory nystagmus in monkeys. T. Raphan, B. Cohen (New York, City University, New York, NY), and V. Henn (Zürich, Universität, Zurich, Switzerland). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 44-55. 28 refs. Swiss National Science Foundation Grant No. 3,343,0,78; Grant No. NIH-NS-00294.

The effects of rotation about an off-vertical axis on the

dynamics of the slow-phase velocity of the induced nystagmus are investigated. Eye movements induced by optokinetic stimulation or by angular rotation about vertical or off-vertical axes were recorded by dc electro-oculography in 12 monkeys of various species seated within a closed drum and viewing a series of alternating vertical black and white stripes. Slow-phase velocity profiles induced by steps of angular velocity indicate that a tilt of the rotation axis 50 deg from the vertical does not affect the initial peak velocity or gain of the vestibulo-ocular reflex, however leads to the decay of the slow-phase velocity to zero, similar to the effects of vision. Off-vertical axis rotation is also observed to cancel the postrotatory nystagmus for velocities up to 50-60 deg/sec, and reduce it relative to that encountered in vertical rotation at higher velocities. In addition, experiments with changes in the inclination of the rotation axis during rotation suggest that the velocity storage mechanism is the same for the generation of continuous nystagmus during visual and vestibular stimulation about the vertical axis and for off-axis rotations. The results are interpreted in terms of a mechanism for nystagmus induced by off-vertical axis rotation which is based on the role of the velocity storage integrator in producing slow changes in eye velocity are a result of otolith and cupula stimulation. A.L.W.

A82-17433 Dynamic characteristics of the otolithic oculomotor system. T. Tokita, H. Miyata, M. Masaki, and S. Ikeda (Gifu University, Gifu, Japan). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 56-68. 11 refs.

Transfer functions of the opto-oculomotor, otolithic oculomotor and opto-otolithic oculomotor systems in humans are investigated. Bode plots of the transfer functions were obtained in 10 healthy adults and five patients with bilateral loss of labyrinth excitability performing a vertical tracking test, an up-down passive displacement, and a running test in the light and the dark. The gain and phase of the opto-oculomotor system as indicated by the tracking test are found to be flat in the frequency range 0.3 to 1.0 Hz. In the up-down test in the dark, the gain of the otolithic oculomotor system increased linearly with an increase in frequency from 0.7 to 5 Hz, while in the light, the gain and phase were flat from 0.3 to 2.5 Hz. Transfer functions calculated from vertical head acceleration as input and vertical eye movement as output in the running test are observed to be similar in the dark and the light, with gain decreasing linearly with frequency increase from 0.3 to 3.0 Hz. The opto-oculomotor responses of the patients with bilateral labyrinth excitability losses are found to be the same as those of normal subjects, while three patients exhibited no eye movement response and two exhibited a periodic eye movement in the up-down test. Rhythmic eye movements corresponding to head movements are also observed in the patients during the running test, although the values of gain and phase are scattered. Results suggest that factors other than the otolithic oculomotor response may produce the observed eye movements. A.L.W.

A82-17434 Binocular counterrolling in humans with unilateral labyrinthectomy and in normal controls. S. G. Diamond and C. H. Markham (California, University, Los Angeles, CA). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 69-79. 15 refs.

A82-17435 * Ocular torsion on earth and in weightlessness. L. R. Young, B. K. Lichtenberg, A. P. Arrott, T. A. Crites, C. M. Oman, and E. R. Edelman (MIT, Cambridge, MA). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 80-92. 16 refs. Grant No. NsG-2032; Contract No. NAS9-15343.

Otolith function is studied by means of measurements of ocular torsion under various acceleration environments on earth and in weightlessness. Photographic measurements of ocular torsion as indicated by the rotation of landmarks on the iris with respect to head-fixed fiducial marks were obtained in subjects undergoing horizontal linear acceleration in a ground-based version of the space sled, lateral acceleration from weightlessness during pullout from the free-fall portion of parabolic flight, and optokinetic stimulation about the roll axis in the supine position in the laboratory and during weightlessness. The responses of ocular torsion to horizontal acceleration are in agreement with a simple low-order linear system with a dominant time constant of 0.33 sec, with a transfer function fit by a model with a pure delay of 0 to 400 msec and a first-order lag. In the pullout experiment, torsion was not observed in response to the onset of acceleration in the right-ear-down position, although it was present in response to the lateral stimulus. Results of the roll vection experiments indicate the independence of ocular torsion and visually induced tilt. In addition, an automatic video system using a soft contact lens target is presented which has been developed for ocular torsion measurements. A.L.W.

A82-17436 Neuronal interaction between ipsilateral medial and lateral vestibular nuclei. I. Matsuoka, J. Ito, M. Sasa, S. Takaori (Kyoto University, Kyoto, Japan), and M. Morimoto (Kochi Medical School, Kochi, Japan). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 93-101. 14 refs.

The existence of direct influences of neurons in the medial vestibular nucleus (MVN) on those of the lateral vestibular nucleus (LVN) that receive input from the peripheral nerve is investigated. Experiments were performed on anesthetized cats by electrophysiological techniques of single neuron activity recording and the horseradish peroxidase retrograde transport method. Stimulation of the MVN is found to lead to spike generation with short latency in LVN neurons monosynaptically activated by vestibular nerve stimulation, although these neurons could not respond to a high-frequency MVN stimulation. Other LVN neurons monosynaptically activated by vestibular nerve stimulation were inhibited by a conditioning stimulus to the MVN, although it is not certain whether the inhibition was monosynaptically produced. The results of the horseradish peroxidase study suggest the existence of direct innervation from the MVN to the LVN, as horseradish peroxidase positive neurons were found in the MVN following tracer ejection in the immediate vicinity of LVN neurons. The results suggest the existence of both excitatory and inhibitory input from the MVN to LVN neurons monosynaptically activated from the vestibular nerve. A.L.W.

A82-17437 The ascending tract of Deiters' and horizontal gaze. S. M. Highstein and H. Reisine (Albert Einstein College of Medicine, Bronx, NY). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 102-111. 29 refs.

The signals carried by the ascending tract of Deiters' (ATD), one of two pathways by which the medial rectus motoneuron pool receives direct signals from the posterior brain stem to maintain horizontal gaze during head motion, are investigated. Horseradish peroxidase studies confirm that the ventral lateral and medial vestibular nuclei contain a mixture of neurons that relay horizontal semicircular canal signals to the abducens nucleus via a direct projection and to the medial rectus subgroup via the ATD, while the results of acute lesions indicate that the ATD follows a middle course between the medial longitudinal fasciculus and the brachium conjunctivum in the pontine tegmentum. Intracellular recordings from medial rectus motoneurons indicate the comparable synaptic potency of the ATD and internuclear projections. Studies of inputs to the ATD neurons in anesthetized paralyzed cats provide evidence for chemical synaptic transmission between vestibular primary afferent and ventral lateral vestibular neurons, and reveal ATD neurons to be strongly modulated by contralateral vestibular stimulation. Finally, studies in the decerebrate and alert cat reveal the ATD neurons to exhibit eye positionbut little rapid eye movement sensitivity, while a strong modulation of activity is obtained in response to head rotation in the horizontal plane. Results suggest that ATD and abducens internuclear signals interact at the level of medial rectus cells to produce the horizontal vestibulo-ocular reflex and conjugate horizontal gaze. A.L.W.

A82-17438 Nonlinear characteristics of single neurons in the vestibular nuclei. J. H. Ryu, B. F. McCabe, and R. W. Babin

(Iowa, University, Iowa City, IA). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 112-129. 12 refs. Research supported by the U.S. Veterans Administration and University of Iowa.

The dynamic properties of the semicircular canal system are investigated by the measurement of the responses of single neurons in the vestibular nuclei to canal stimulation. Extracellular recordings of the activity of 99 vestibular nucleus neurons were obtained in cats undergoing impulse and step stimulation of the horizontal canals by angular acceleration on a rate table. A nonlinear response of the vestibular neurons to canal stimulation is evidenced by a nonlinear decrease in the time to reach the maximum response level with an increase in stimulus magnitude, a nonlinear increase in maximum response level with increasing stimulus magnitude, and the fact that the neural response to excitatory stimulus is not the mirror image of the response to an inhibitory stimulus. It is found that the nonlinear response cannot be accounted for by simulations based on several linear mathematical models of vestibular canal function. It is suggested that the nonlinearities observed may arise from (1) the nonlinear behavior of the eng organ; (2) central nervous system influence; or (3) the inherent neural properties of the vestibular nuclei. A.L.W.

A82-17439 Reticulovestibular organization participating in generation of horizontal fast eye movement. S. Sasaki and H. Shimazu (Tokyo, University, Tokyo, Japan). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 130-143. 26 refs.

The functional characteristics and axonal projections of the excitatory reticular burst neurons (EBNs), which have been identified as immediate premotor neurons participating in the activation or suppression of abducens motor activity during horizontal fast eye movement, are investigated. Spike recordings were obtained from 62 individual burst neurons in the dorsomedial reticular formation exhibiting activity only at the quick excitatory phase of the ipsilateral abducens nerve in cats undergoing horizontal rotation or electrical stimulation of the vestibular nerve. EBN discharge patterns indicate the presence of two classes of unidirectional burst neurons, with medium and long lead times. Most EBNs were antidromically activated by microstimulation within the ipsilateral abducens nucleus, indicating that the neuron sends its axon to or through the nucleus. Both the medium- and long-lead EBNs identified by antidromic activation are located in a region immediately rostral to the abducens nucleus. Microelectrode tracking reveals the axons of the EBNs to also project caudally, with collaterals to the inhibitory burst neurons and the medial vestibular nucleus. Microstimulation of the EBN area results in responses in the abducens-motoneurons suggestive of monosynaptic connections with facilitation, and spike characteristics in the inhibitory burst nuclei and the medial vestibular nucleus indicating monosynaptic excitatory connections. A.L.W.

A82-17440 Horizontal eye movement signals in second-order vestibular nuclei neurons in the cat. A. Berthoz, K. Yoshida, and P. P. Vidal (CNRS, Paris, France). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 144-156. 28 refs. Research supported by the Centre National de la Recherche Scientifique, Institut National de la Santé et de la Recherche Médicale, and Fondation de France.

A82-17441 A transsynaptic autoradiographic study of the pathways controlling the extraocular eye muscles, using /I-124/B-IIb Tetanus toxin fragment. J. A. Büttner-Ennever, P. Grob, K. Akert (Zürich, Universität, Zurich, Switzerland), and B. Bizzini (Paris, Institut Pasteur, Marnes-la-Coquette, Hauts-de-Seine, France). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 157-170. 53 refs. Research supported by the Dr. Eric Slack-Gyr Foundation and EMDO-Stiftung; Swiss National Science Foundation Grants No. 3,636,75; No.3,611,75.

A82-17442 Some thoughts about the three neurons in the vestibular ocular reflex. R. Baker, C. Evinger, and R. A. McCrea (New York University, Medical Center, New York, NY). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 171-188. 77 refs. Grants No. PHS-NS-13742; No. NIH-EY-02007.

Conceptual and experimental progress in the understanding of the organization and functioning of the three-neuron arc believed to produce compensatory eye movement following head rotation is outlined. Following a brief review of the purpose of the vestibular-ocular reflex (VOR) and the type of information encoded in the first- and second-order vestibular neurons and the motoneuron, measurements of the discharge rates of the primary afferent vestibular neurons and the secondary vestibular neurons in cats and primates are presented, and the similarity of central VOR organization and presumably neural processing in the two species is noted. It is argued that understanding of the three-neuron pathway has important implications for the central organization of other oculomotor subsystems, and for fixation. Difficulties in modeling the VOR with neurons reflecting population values are pointed out, and a possible solution based on tuned channels responding selectively throughout the oculomotor range to specific head movement frequencies is suggested. Finally, morphological evidence supporting the location of the phase integrator responsible for providing a second source of input to the extraocular motor nuclei in the prepositus nucleus is presented. A.L.W.

A82-17443 Cat medial pontine neurons in vestibular nystagmus. C. H. Markham (California, University, Los Angeles, CA), S. Nakao (Tottori University, Yanago, Japan), and I. S. Curthoys (Sydney, University, Sydney, Australia). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 189-209. 35 refs.

A82-17444 Is transmission between the vestibular type I hair cell and its primary afferent chemical. D. A. Schessel and S. M. Highstein (Albert Einstein College of Medicine, Bronx, NY). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 210-214. 17 refs.

A morphophysiological study is presented of the nature of the transmission between the vestibular type I hair cell and the primary afferent almost completely surrounding it in a calyx configuration. The study was performed with intracellular electrodes loaded with horseradish peroxidase to record from irregular fibers in the vestibular primary afferents of the horizontal semicircular canal of the lizard Calotes versicolar. All the irregular fibers injected with horseradish perioxidase are observed to terminate with calyceal endings in the cristae and to be innervated by one to five type I hair cells. The frequency and pattern of subthreshold activity in the neurons are characteristic of chemical synaptic transmission rather than electronic, although the shape of the depolarizations is not typical of chemical excitatory postsynaptic potentials. A.L.W.

A82-17445 Organization of the avian accessory optic system. N. C. Brecha and H. J. Karten (New York, State University, Stony Brook, NY). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 215-229. 46 refs. Grants No. NIH-NS-12078; No. NIH-EY-02146.

The organization of the accessory optic system (AOS) and its possible role in oculomotor function in birds are discussed. Studies in pigeons demonstrating the connection of the basal optic root with displaced ganglion cells of the contralateral retina which may be involved in the detection of movements in peripheral visual fields are noted. The projections of the nucleus of the basal optic root complex found on the vestibulocerebellum, inferior olivary complex and oculomotor complex are examined which support the contention that the AOS plays a role in oculomotor function. Electrophysiological and behavioral studies also suggesting the role of the

AOS in oculomotor function, possibly in the initiation of an orienting movement of the eyes and neck and/or the stabilization of eye and neck movements, are pointed out. A.L.W.

A82-17446 Visual-vestibular interaction in vestibular neurons - Functional pathway organization. W. Precht (Zürich, Universität, Zurich, Switzerland). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 230-248. 35 refs. Research supported by the Dr. Eric Slack-Gys Foundation; Swiss National Science Foundation Grants No. 3,505,79; No. 3,616,80.

Experiments performed to examine the pathways mediating the optokinetic responses of vestibular nuclei (Vn) in the rat and cat are described. Single unit electrooculogram recordings were made in alert, both paralyzed and unparalyzed, rats and cats with or without brain lesions. The animals' eye movements elicited in the dark by trapezoidal or sinusoidal rotation of a Toennis turntable were tracked to identify type I or type II neuron excitement. All animals were sacrificed after the experiment and the brain lesions were identified. It was found that the pretectum is the first central relay in the horizontal optokinetic reflex path through Vn, and that the nucleus reticularis tegmenti pontis projects by way of oligosynaptic chains to Vn. Further experiments to find an intermediary neuron between the pretectum and Vn are indicated. M.S.K.

A82-17447 Neural activity in the nucleus reticularis tegmenti pontis in the monkey related to eye movements and visual stimulation. E. L. Keller and W. F. Crandall (Smith-Kettlewell Institute of Visual Sciences, San Francisco, CA). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 249-261. 27 refs. Research supported by the Smith-Kettlewell Eye Research Foundation; Grants No. NIH-R01-EY-03280-01; No. NIH-5-P30-EY-01186.

A82-17448 Visual-vestibular interactions in visual cortical cells in the cat. R. H. Lahue, Jr., S. Reinis (Waterloo, University, Waterloo, Ontario, Canada), J. P. Landolt, and K. E. Money (Defence and Civil Institute of Environmental Medicine, Downsview, Ontario, Canada). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 262-273. 31 refs. Research supported by the Defence and Civil Institute of Environmental Medicine.

A82-17449 Circularvection - Psychophysics and single-unit recordings in the monkey. U. Büttner and V. Henn (University Hospital, Zurich, Switzerland). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 274-283. 21 refs. Swiss National Science Foundation Grant No. 3,343,78.

Experiments are carried out to explore the upper frequency limit of sinusoidal rotation of the visual surround, which can lead either to circularvection (CV) in humans and to the modulation of vestibular-unit activity in monkeys. Two paradigms are used in the experiments. In the first, human subjects are exposed to sinusoidal rotation of an optokinetic cylinder totally enclosing the subject. Stimulus frequency of cylinder rotation is increased until the subjects no longer experience CV, perceiving only the motion of the surround. All subjects experience at least partial CV, even at stimulus frequencies above 1 Hz. In the second paradigm, monkeys are exposed to sinusoidal cylinder rotation of differing frequencies, and single-unit responses are measured in the vestibular cortex. Comparison of these responses with those of the vestibular nuclei shows that cortical neurons respond over a wider range of visual frequencies and therefore must receive additional visual input. C.R.

A82-17450 Sigma-movement and Sigma-nystagmus - A new tool to investigate the gaze-pursuit system and visual-movement perception in man and monkey. B. Adler, G. Curio, O.-J. Grüsser, M. Pause, U. Schreiter, L. Weiss (Berlin, Freie Universität, Berlin, West Germany), and H. Collewijn (Berlin, Freie Universität, Berlin, West Germany; Rotterdam, Universiteit, Rotterdam, Netherlands). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 284-302. 26 refs. Research supported by the European Science Foundation; Deutsche Forschungsgemeinschaft Contract No. Gr-161.

It is shown that Sigma-phenomena can be elicited not only by unidimensional periodic stimuli that are stabilized on the retina but also by (1) two-dimensional stimulus patterns composed of equidistant dots; (2) spatial periodic stimuli, the periodicity of which is not present on each retina but generated on the cyclopean retina; (3) three-dimensional objects of a spatially periodic structure; and (4) two-dimensional random dot patterns without any spatial periodicity. It is also demonstrated that constant flash intervals are not requisite for Sigma-movement, that a regular interaction occurs between the vestibulo-ocular reflex and the Sigma-movement, and that Sigma-phenomena can be elicited in awake monkeys. The phenomenon is thus accessible to further neurophysiological exploration. C.R.

A82-17451 Motion sickness due to vision reversal - Its absence in stroboscopic light. G. Melvill Jones and G. Mandl (McGill University, Montreal, Canada). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 303-311. 31 refs.

The modification of oculomotor control incurred by a period of vision reversal in stroboscopic light was examined over an extended frequency range to detect physiological correlates that may account for the absence of motion sickness under these conditions. Adaptive changes were found over a broad frequency spectrum after vision reversal in normal light, although the changes were restricted to a low frequency range in the stroboscopic illumination. The physiological drive to bring about adaptive change was considerably attenuated by the stroboscopically illuminated environment with specific elimination of the adaptive response in the range of 1.75-3.0 Hz, which implies a functional association between the incidence of motion sickness and the prevailing strength and/or frequency range of the adaptive drive. D.L.G.

A82-17452 Natural retinal image motion - Origin and change. H. Collewijn (Rotterdam, Universiteit, Rotterdam, Netherlands), A. J. Martins, and R. M. Steinman (Maryland, University, College Park, MD). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 312-329. 14 refs. NSF Grants No. BNS-77-16474; No. BNS-80-25344; No. BNS-80-13508.

The true function of the vestibulo-ocular reflex (VOR) is thought to be more subtle than has been suspected. It is contended that the VOR serves not simply to stabilize the retinal image of a fixated object during movement but, rather, to produce and maintain the retinal image motion within each eye and between the eyes that is optimal for binocular vision. It is shown that compensation is rarely virtually perfect; even when virtually perfect in one eye, it is not in the other, leading to noncorrespondence of fixation positions between the eyes and high vergence velocities. It is also shown that the degree of compensation in the light is the same with active and passive rotations and that the VOR in the light adapts completely within minutes. The VOR in the dark is found to adapt within minutes to as much as 90% of the required change. C.R.

A82-17453 Vestibular habituation in man and monkey during sinusoidal rotation. J. Jäger and V. Henn (University Hospital, Zurich, Switzerland). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 330-339. 15 refs. Swiss National Science Foundation Grant No. 3,343,0,78.

Vestibular habituation experiments were performed in monkeys and humans to determine what stimuli lead to habituation, how it relates to unit activity in the neurons along the vestibulo-ocular reflex, and how animal experiments can be related to human physiology and the sensation of motion. Experiments on vestibular

habitation by repeated steps of angular velocity led to a shortening of nystagmus and to essentially similar results for humans and monkeys. High-frequency sinusoidal rotation above 0.1 Hz was found to be ineffective, while low-frequency stimulation from 0.0015 to 0.05 Hz led to a dramatic shortening of time constants after only a few cycles of stimulation. Habituation with sinusoidal velocity profiles were reported as a pleasant experience, which stands in contrast to the experience with the programs that are aimed at reducing motion sickness. D.L.G.

A82-17454 Unilateral habituation of vestibulo-ocular responses in the cat. M. Jeannerod, G. Clement, J. H. Courjon (Institut National de la Santé et de la Recherche Médicale, Bron, Rhône, France), and R. Schmid (Pavia, Università, Pavia, Italy). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 340-351. 17 refs.

Unilateral vestibulo-ocular reflex (VOR) changes are investigated in cats exposed to vestibular and/or optokinetic training. The transfer of vestibular habituation aquired with one type of stimulation to oculomotor responses induced by another type are also examined. Results reconfirm the suggestion that habituation is due to a selective mechanism that modifies the gain and the dynamic characteristics of the VOR. Prolonged moving visual stimulation improves optokinetic responses by about 25 percent in cats, and produces static and dynamic VOR changes. The presence of a static VOR imbalance following optokinetic training as opposed to vestibular training, could account for the different degrees of retention of habituation. D.L.G.

A82-17455 * Visually induced self-motion sensation adapts rapidly to left-right reversal of vision. C. M. Oman and O. L. Bock (MIT, Cambridge, MA). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 352-360. 24 refs. Grant No. NsG-2032; Contract No. NAS9-15343.

Three experiments were conducted using 15 adult volunteers with no overt oculomotor or vestibular disorders. In all experiments, left-right vision reversal was achieved using prism goggles, which permitted a binocular field of vision subtending approximately 45 deg horizontally and 28 deg vertically. In all experiments, circularvection (CV) was tested before and immediately after a period of exposure to reversed vision. After one to three hours of active movement while wearing vision-reversing goggles, 10 of 15 (stationary) human subjects viewing a moving stripe display experienced a self-rotation illusion in the same direction as seen stripe motion, rather than in the opposite (normal) direction, demonstrating that the central neural pathways that process visual self-rotation cues can undergo rapid adaptive modification. G.R.

A82-17456 Patterns of vestibular and neck responses and their interaction - A comparison between cat cortical neurons and human psychophysics. T. Mergner, L. Deecke, and W. Becker (Ulm, Universität, Ulm, West Germany). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 361-372. 16 refs. Deutsche Forschungsgemeinschaft Contract No. SFB-70.

The paper reports on neuronal responses recorded from the anterior suprasylvian cortex in cats subjected to labyrinthine, neck and combined stimulation in the horizontal plane. Preliminary results from human psychophysics are also reported, with emphasis on what naive humans report when subjected to the same stimuli as the animals. Processing includes whole-body rotation, isolated trunk rotation, and isolated head rotation. Subtraction provides a basis for the discrimination between whole-body and isolated head rotation, and addition may optimize the indication of movement and position of the head in space. Evidence is found that during whole body rotation and isolated trunk or head rotation, essentially the same processing of labyrinthine and neck afferent inputs take place in neurons of the cats' anterior suprasylvian cortex and in humans who try to distinguish the stimulus. D.L.G.

A82-17457 Responses of vestibulospinal neurons to neck and macular vestibular inputs in the presence or absence of the paleocerebellum. R. Boyle and O. Pompeiano (Pisa, Università, Pisa, Italy). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 373-394. 43 refs. Research supported by the Consiglio Nazionale delle Ricerche; Grant No. NIH-NS-07685-12.

A82-17458 Dynamics of vestibulo-ocular, vestibulocollic, and cervicocollic reflexes. B. W. Peterson, G. Bilotto, J. Goldberg, and V. J. Wilson (Rockefeller University, New York, NY). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 395-402. 15 refs. Grants No. NIH-EY-02249; No. NIH-EY-00100; No. NIH-NS-02619.

The properties of the vestibulocollic reflex (VCR) were studied with natural stimulation over an extended frequency range and compared with properties of the vestibulo-ocular reflex (VOR). The effect of medial longitudinal fasciculus (MLF) transection on the behavior of the reflex evoked by sinusoidal rotation at frequencies ranging from 0.5 to 4 Hz was also explored. An investigation was conducted regarding the dynamic properties of the cervicocollic reflex (CCR). The response was found to be very similar to the VCR response. This result suggests that the CCR can also be considered to be a second-order lag-lead system. Attention is also given to the interaction of vestibulocollic reflex and cervicocollic reflex. G.R.

A82-17459 Early directional influence of visual motion cues on postural control in the falling monkey. M. Lacour, C. Xerri (Aix-Marseille I, Université, Marseille, France), and P. P. Vidal (Aix-Marseille I, Université, Marseille; CNRS, Laboratoire de Physiologie du Travail, Paris, France). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 403-411. 20 refs. Research supported by the Institut National de la Sante et de la Recherche Médicale and Centre National de la Recherche Scientifique.

A82-17460 Velocity storage, nystagmus, and visual-vestibular interactions in humans. B. Cohen, T. Raphan, D. Dennett (New York, City University, New York, NY), and V. Henn (New York, City University, New York, NY; Zürich, Universität, Zurich, Switzerland). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 421-433. 32 refs. Grant No. NIH-NS-00294.

The purpose is to determine whether stored activity related to slow-phase eye velocity is present in humans and whether it contributes to visual-vestibular interactions. Data are presented demonstrating the following manifestations of stored activity related to slow-phase eye velocity: (1) optokinetic after-nystagmus (OKAN) is present after optokinetic stimulation; (2) postrotatory nystagmus velocity measured in darkness was reduced after rotation in light; (3) the velocity storage mechanism became partially charged by exposure to full-field motion for short periods of time; (4) it was discharged by exposure to a fixed visual field; and (5) various rates of field motion relative to the subject increased or decreased postrotatory nystagmus in a predictable fashion. C.R.

A82-17461 Aftereffects of vestibular and optokinetic stimulation and their interaction. E. Koenig and J. Dichgans (Tübingen, Universität, Tübingen, West Germany). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 434-445. 21 refs.

The influence of prior vestibular stimulation and subsequent whole-field optokinetic stimulation, or the presentation of a stationary pattern on after-nystagmus (AN) was studied in humans. Pure vestibular and pure optokinetic stimuli were employed for comparison. The presentation of a stationary pattern resulted in suppression

of vestibular nystagmus, which recovered after the termination of fixation. During combinations of vestibular and optokinetic stimuli, when the elicited vestibular (VN) and optokinetic nystagmus (OKN) had the same direction, there was a weak AN I toward the direction of the preceding VN and OKN, and a strong AN II toward the opposite side. AN was always stronger into the direction opposite to the previously elicited VN, indicating that the vestibular afference is the predominant input to the secondary vestibular integrator. D.L.G.

A82-17462 The role of the dentate nucleus and y-group in the generation of vertical smooth eye movements. M. C. Chubb and A. F. Fuchs (Washington, University, Seattle, WA). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 446-454. 16 refs. Grants No. NIH-RR-00166; No. NIH-EY-00745; No. NIH-GM-00260.

The considered investigation makes use of a study of the relation of the neuronal activity to vertical eye movements and adequate vestibular stimulation. Three adolescent rhesus macaques (Macaca mulatta) were trained to track a small visual target while undergoing vertical sinusoidal angular acceleration. The tracking task made it possible to obtain various combinations of passive head rotation and eye movements. Recordings of neuron activity were made in all three monkeys, but electrical stimulation was applied to only one monkey. In the y-group and dentate nucleus region, most units exhibited increases in firing rate related to upward eye velocity during smooth pursuit and upward head velocity during suppression of the vestibulo-ocular reflex (VOR). G.R.

A82-17463 The brain-stem projection to the cerebellar flocculus relevant to optokinetic responses in cats. T. Kawasaki, Y. Sato, K. Mizukoshi (Toyama Medical and Pharmaceutical University, Toyama, Japan), and I. Kato (Toyama Medical and Pharmaceutical University, Toyama; Yamagata University, Yamagata, Japan). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 455-464. 31 refs.

A82-17464 Visual mossy fiber inputs to the flocculus of the monkey. H. Noda (California, University, Los Angeles, CA). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 465-475. 16 refs. Grant No. NIH-R01-EY-01051.

A study was conducted regarding the characteristics of visual signals which are brought to the flocculus of the monkey. The study was based on 19 visually responsive mossy fiber units, which were selected from a total of 1,858 units recorded from the flocculus of seven monkeys (Macaca nemestrina). Among the 1,858 units, 116 units were identified as mossy fibers on the basis of the criteria used in a preceding study. The results of the study demonstrated clearly that the visual system is an important source of sensory input to the flocculus in the monkey. Mossy fibers showing responses to movements of a random-dot background were encountered in the white matter of the flocculus. Out of 116 mossy fiber units, 19 responded to movements of visual patterns. A common feature of the responses of visual mossy fiber units was directional selectivity. G.R.

A82-17465 Mossy fiber activation of the cerebellar flocculus from the visual system. K. Maekawa, M. Kimura, and T. Takeda (Jichi Medical School, Tochigi, Japan). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 476-490. 40 refs. Ministry of Education of Japan Grants No. 311401; No. 57780; No. 377060.

A description is given of laboratory studies carried out to trace visual mossy fiber pathways in rabbits by means of electrophysiological and morphological (horseradish peroxidase) methods. It is shown that optic signals, after being transferred by neurons of the optic track nucleus, descend in the brain stem to activate the ipsi- and/or contralateral neurons of the nucleus reticularis tegmenti pointis (NRTP). The signals eventually reach the flocculus and bring about the mossy fiber activation of floccular Purkinje cells, which are known to project to the vestibular nuclei and to modify eye movements. The visual mossy fiber pathway through the NOT-NRTP to the flocculus contributes to optokinetic eye movements but not to a visually guided adaptive change of the vestibulo-ocular responses. C.R.

A82-17466 Input-output activity of the primate flocculus during visual-vestibular interaction. W. Waespe, U. Büttner, and V. Henn (Zürich, Universität, Zurich, Switzerland). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 491-503. 23 refs. Swiss National Science Foundation Grant No. 3,343,2,78.

Cerebellar lesions in patients lead to deficits in pursuit eye movements, reduced optokinetic nystagmus, and the inability to suppress vestibular nystagmus by visual fixation. Lesions of the flocculus in primates lead to the same clinical syndrome. It is shown that floccular Purkinje cells modulate their activity to either enhance optokinetic nystagmus or suppress vestibular nystagmus during various paradigms of visual-vestibular interaction. The hypothesis is that the flocculus and the vestibular nuclei process visual-vestibular information in a complementary way: floccular Purkinje cells are modulated when vestibular nuclei activity is insufficient to move the eyes with adequate velocity, or when vestibular nuclei neurons still are modulated but nystagmus is suppressed. (Author)

A82-17467 Directional plasticity of the vestibulo-ocular reflex in the cat. L. W. Schultheis and D. A. Robinson (Johns Hopkins University, Baltimore, MD). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 504-512. 23 refs. Grant No. NIH-EY-00598.

Eight, healthy, female cats were used in this investigation. Cross-axis nystagmus was found in every cat. It is concluded that it is a general phenomenon normally present in all members of the species. Since the cross-axis eye movements had the same latency as the vestibulo-ocular reflex, cross-axis plasticity probably represents a modification of the normal vestibulo-ocular wiring as a consequence of the system's ability for self-repair, rather than some learned following movement that can occur in the dark. Vestibulo-ocular plasticity across axes seemed to depend on the magnitude and direction of image slip on the retina during training. It is suggested that the cerebellum is an important component of the learning machine that enables modification of the direction as well as the gain of the reflex, although its exact mode of action remains unknown. G.R.

A82-17468 The 'Error' signals subserving adaptive gain control in the primate vestibulo-ocular reflex. F. A. Miles and S. G. Lisberger (National Institutes of Health, National Institute of Mental Health, Bethesda, MD). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 513-525. 32 refs.

Substitutes for vestibular (head-velocity) signals are considered, taking into account experiments conducted on the monkey. It is concluded that, with respect to the monkey, eye movements per se are irrelevant so far as adaptive gain control of the vestibulo-ocular reflex (VOR) is concerned. The computation of VOR gain errors in the monkey appears to utilize some direct, internal measure of head velocity, with the vestibular signal itself presumably a prime candidate. In view of the obtained findings, it was expected that prolonged sinusoidal optokinetic stimulation would have no significant effect on VOR gain in the monkey, and this is borne out by experiment. Attention is given to substitutes for retinal slip signals, the primate flocculus, and VOR gain changes resulting from foveal pursuit tracking. A new hypothesis is presented regarding adaptive gain control in the primate VOR. G.R.

A82-17469 * Active head rotations and eye-head coordination. W. H. Zangemeister and L. Stark (California, University, Berkeley, CA). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology,*

New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals, vol. 374, Nov. 6, 1981, p. 540-559. 26 refs. Research supported by the Deutsche Forschungsgemeinschaft; Grant No. NCC2-86.

It is pointed out that head movements play an important role in gaze. The interaction between eye and head movements involves both their shared role in directing gaze and the compensatory vestibular ocular reflex. The dynamics of head trajectories are discussed, taking into account the use of parameterization to obtain the peak velocity, peak accelerations, the times of these extrema, and the duration of the movement. Attention is given to the main sequence, neck muscle EMG and details of the head-movement trajectory, types of head model accelerations, the latency of eye and head movement in coordinated gaze, gaze latency as a function of various factors, and coordinated gaze types. Clinical examples of gaze-plane analysis are considered along with the instantaneous change of compensatory eye movement (CEM) gain, and aspects of variability. G.R.

A82-17470 Vestibular influence upon head-eye coordination. G. R. Barnes and A. J. Prosser (RAF, Institute of Aviation Medicine, Farnborough, Hants., England). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 560-570. 10 refs.

In the considered investigation an attempt was made to quantify the interaction of the nystagmus fast phase and the saccadic eye movement by instructing the subject to make voluntary head movements during the period of a postrotational vestibular stimulus. Eight subjects took part in the experiments. Subjects were rotated on a turntable for a period of 60 seconds. At the end of this period, rotation was stopped abruptly with the subject coming to rest facing in the direction of a center target light. During the ensuing period, in which a potent nystagmus was present, the subjects were exposed to one of two experimental conditions, including either target flash presentation or voluntary head rotation in the dark. The results of the investigation demonstrate that the presence of a concurrent stimulus to the vestibular system can significantly modify the temporal characteristics of head-eye coordination during voluntary head movements. G.R.

A82-17471 Disturbances of eye-head coordination during lateral gaze in labyrinthine disease. T. Uemura, Y. Arai, and C. Shimazaki (Tokyo Women's Medical College, Tokyo, Japan). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 571-578. 9 refs.

A82-17472 The interaction between accuracy of gaze with and without head movements in patients with cerebellar ataxia. M. Yoshida (Jichi Medical School, Tochigi, Japan). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 579-589. 25 refs. Research supported by the Ministry of Health and Welfare of Japan.

A82-17473 Nystagmus, gaze shift, and self-motion perception during sinusoidal head and neck rotation. J. M. B. V. de Jong, G. Bovenkerk (Amsterdam, Universiteit, Amsterdam, Netherlands), and W. Bles (Amsterdam, Universiteit; Free University Hospital, Amsterdam, Netherlands). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 590-599. 11 refs.

A82-17474 A hypothetical explanation for periodic alternating nystagmus - Instability in the optokinetic-vestibular system. R. J. Leigh, D. A. Robinson, and D. S. Zee (Johns Hopkins University, Baltimore, MD). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 619-635. 40 refs. Grants No. NIH-EY-05264; No. NIH-AG-00061; No. NIH-EY-00598; No. NIH-EY-01849; No. NIH-NS-11071; No. NIH-EY-01765.

A82-17475 Effect of frontal-eye-field lesion on eye-head coordination in squirrel monkeys. T. O-Uchi, M. Igarashi, and T. Kubo (Baylor University, Houston, TX). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 656-673. 51 refs. Research supported by the McFadden Charitable Trust Research Fund; Grants No. NIH-NS-10940; No. NIH-NS-07237.

A number of investigations appear to suggest the possibility that the frontal eye field (FEF) is involved in eye-head coordination. A study was conducted concerning the effect of FEF ablations on eye-head coordination during optokinetic and vestibular stimulation. Five healthy adult squirrel monkeys (Saimiri sciureus) weighing an average of 750 grams were used for this study. The obtained results suggest that the FEF was involved in spatial and/or temporal modulation of eye and head movements, but not involved in eye-head coordination under the present experimental conditions. G.R.

A82-17476 Acoustic-induced eye movements. K.-P. Schaefer, K.-J. Süss, and E. Fiebig (Göttingen, Universität, Göttingen, West Germany). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 674-688. 43 refs. Deutsche Forschungsgemeinschaft Contract No. SFB-33.

The influence of moving acoustic signals on oculomotor functions is investigated. Moving acoustic signals of varying frequency and form are applied, and visual-acoustic and vestibular-acoustic interactions are examined. Involuntary eye movements are observed in 20% of all test subjects, and are most pronounced in darkness when there is no fixation. Eye movements are influenced only slightly by a change in the amplitude of the sound movement from + or - 15 to 90 deg. Single burst signals at increasing repetition rates result in orienting reactions on the individual signals, while at high signal repetition rates above 0.5 Hz, continuous eye movements in the form of staircase jerks result. D.L.G.

A82-17477 Modifications of vestibular nystagmus produced by fixation of visual and nonvisual targets. R. Schmid, D. Zambarbieri, and G. Magenes (Pavia, Università, Pavia, Italy). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 689-705. 38 refs. Research supported by the Consiglio Nazionale delle Richerche.

The purpose is to further investigate the modifications of vestibular nystagmus produced by the presentation of nonvisual targets either stationary in space or moving with the subject. A quantitative-model interpretation of the experimental results provides useful suggestions on the respective roles of vestibulo-ocular reflex (VOR)-gain control and smooth-pursuit (SP) in adapting the vestibulo-ocular response to the actual oculomotor task. C.R.

A82-17478 A physical model of human postural dynamics. C. W. Stockwell, S. H. Koozekanani, and K. Barin (Ohio State University, Columbus, OH). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 722-730. 17 refs. Grant No. NIH-NS-13903.

A four-link model has been developed by adding a three-link model reported by Hemami and Jaswa (1978) to the triangular foot considered by Gurfinkel (1973). The model describes the human body in the sagittal plane with arms folded across the chest. It assumes that the body segments rotate about simple pin joints and that the spine is rigid. It further assumes that the left and right ankle joints rotate about the same axis and that the feet do not move. The body is modeled as a system composed of five homogeneous rigid segments. An investigation has been conducted to determine whether the model is adequate to describe human body sway or whether an even more complex model is required. The results thus far indicate that a four-degrees-of-freedom physical model of human postural sway is necessary and probably sufficient. The model is complex, but the governing equations are written in a form that makes evaluation feasible with a digital computer. G.R.

A82-17479 **Dissociation of the eyes in saccadic movement.** T. Miyoshi, S. Hiwatashi, S. Kishimoto, and A. Tamada (Kyoto University, Kyoto, Japan). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 713-743. 13 refs.

It is found that in horizontal saccades, abduction and adduction are not conjugate. Abduction commences shortly before adduction and reaches the turning point shortly after adduction. The duration in binocular recording is significantly shorter than in monocular recordings. The abducting eye exhibits a tendency to move gradually on the new target. The adducting eye, however, has a tendency to overshoot. The characteristics of quick phases of horizontal optokinetic nystagmus, in which both eyes jump disconjugately to the new target, are found to be similar to those of horizontal saccades. The principal cause of this disparity may be a difference in neural mechanisms between abduction and adduction. It is noted that vertical saccades are not disconjugate. C.R.

A82-17480 **Different effects involved in the interaction of saccades and the vestibulo-ocular reflex.** R. Jürgens, W. Becker, and P. Rieger (Ulm, Universität, Ulm, West Germany). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 744-754. 6 refs. Deutsche Forschungsgemeinschaft Contract No. SFB-70/U3.

It is thought that the mechanism responsible for the particular type of interaction that occurs between saccades and the vestibulo-ocular reflex (VOR) is related to the mechanism by which goal-directed saccades achieve their accuracy. To pursue this idea, the accuracy of goal-directed saccades during sinusoidal head rotation is investigated. It is demonstrated that saccades under such conditions have a better accuracy than expected on the basis of the results of Jurgens et al. (1981). The accuracy of human goal-directed saccades during passive sinusoidal whole-body rotation is found to be the same as that of normal saccades with the head still. There are two mechanisms contributing to this accuracy: (1) the incomplete summation (on the average, 70%) of saccade and VOR velocities; and (2) the lengthening of the duration of saccades during head rotation when VOR and saccade velocities have the same direction and the shortening of the duration when the directions are opposite. C.R.

A82-17481 **Temporal bone characteristics in Meniere's disease.** J. Stahle, H. F. Wilbrand, and H. Rask-Andersen (University Hospital, Uppsala, Sweden). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 794-807. 27 refs. Research supported by the Statens Medicinska Forskningsrad. SMF Project 3908.

The diminished periaqueductal pneumatization of the petrous portion of the temporal bone in patients with Meniere's disease may affect the tomographic reproducibility of the aqueduct. Tomography may serve as a tool by providing a basis for the choice of surgical procedure. Histologic and Roentgenologic studies indicate that the pars rugosa of the endolymphatic sac in normals is housed inside the distal part of the vestibular aqueduct. In patients with Meniere's disease the sac might be located outside the aqueduct and therefore deprived of the functions of the loose and vascular tissue which normally surrounds it within the aqueduct, influencing the total vascular supply of the sac, and in turn interfering with its resorptive and immunodefensive functions. O.C.

A82-17482 * **Microdisc gel electrophoresis in sodium dodecyl sulfate of organic material from rat otoconial complexes.** M. D. Ross, K. G. Pote, K. E. Rarey, and L. M. Verma (Michigan, University, Ann Arbor, MI). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 808-819. 25 refs. Grants No. NsG-9047; No. NIH-AG-00767.

The gravity receptors of all vertebrates utilize a 'test mass' consisting of a complex arrangement of mineral and organic substance that lies over the sensory receptor areas. In most vertebrates, the mineral is a polymorph of calcium carbonate in the form of minute, single crystals called otoconia. An investigation is conducted to determine the number of proteins in otoconial complexes and their molecular weights. The investigation makes use of a microdisk gel electrophoresis method reported by Gainer (1971). The most important finding of the reported research is that analysis of the proteins of the organic material of the otoconial complexes is possible when sensitive microanalytical methods are employed. Further modification of the basic technique employed and the inclusion of other sensitive staining methods should mean that, in the future, protein separation by molecular weight will be possible in sample pools containing only two otoconial masses. G.R.

A82-17483 **The role of the plantar mechanoreceptor in equilibrium control.** I. Watanabe and J. Okubo (Tokyo Medical and Dental University, Tokyo, Japan). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 855-864. 19 refs.

A method for adding weight resistance to the plantar mechanoreceptors is described. The method is used in studying body-sway control mechanisms. Twenty subjects having no history of labyrinth disturbances or head injuries are used in the experiments. Of these, 16 are chosen for plantar-mechano-receptor stimulation. The order of use of the three plates is chosen at random. For purposes of comparison, 10 subjects are given a breath-holding test. It is thought that the stimulation of plantar mechanoreceptors under the experimental conditions produces its influence not only at the spinal level but is input to a higher level of the nervous system. C.R.

A82-17484 **Ocular torsion in the cat after lesions of the interstitial nucleus of Cajal.** J. H. Anderson (Minnesota, University, Minneapolis, MN). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 865-871. 27 refs. Research supported by the University of Minnesota and NATO; Grants No. NIH-R01-NS-16567; No. NIH-P50-NS-12125.

The response to stimulation of the otolith organs during static lateral tilt is studied. In the considered case, the response is a rotation of the eyes opposite to the head tilt and is assumed not to be influenced by the semicircular canals. The objective of the study is to compare the amount of ocular counterrolling in normal cats and in cats with lesions of the interstitial nucleus of Cajal (INC). Some evidence is to be obtained that might suggest whether or not the INC plays a role in the canal-otolith interactions vis-a-vis the vertical vestibulo-ocular reflex (VOR). The results from the animals with lesions of the interstitial nucleus of Cajal suggest that the INC can influence the torsional position of the eyes. G.R.

A82-17568 **Evaluation of the parallel conductor theory for measuring human limb blood flow by electrical admittance plethysmography.** H. Shimazu, K.-I. Yamakoshi (Hokkaido University, Hokkaido, Japan), T. Togawa (Tokyo Medical and Dental University, Tokyo, Japan), M. Fukuoka, and H. Ito (Kyorin University, Tokyo, Japan). *IEEE Transactions on Biomedical Engineering,* vol. BME-29, Jan. 1982, p. 1-7. 21 refs. Research supported by the Ministry of Welfare of Japan.

A82-17569 **Magnetic measurement of cardiac volume changes.** T. Katila, T. Tuomisto, T. Varpula (Helsinki University of Technology, Esbo, Finland), R. Maniewski (Polish Academy of Sciences, Institute of Biocybernetics and Biomedical Engineering, Warsaw, Poland), and P. Siltanen (Helsinki University, Central Hospital, Helsinki, Finland). *IEEE Transactions on Biomedical Engineering,* vol. BME-29, Jan. 1982, p. 16-25. 19 refs. Research supported by the Academy of Finland and Emil Aaltonen Foundation.

The spatial distribution of the magnetic susceptibility plethysmography (MSPG) signal across the chest of normal subjects is presented for magnetic measurements of cardiac volume changes. Ventricular ejection of blood is exhibited in signals measured above the heart, and on the upper and lower thorax. The temporal behavior of the MSPG is compared with results obtained from existing clinical methods, including magnetic induction plethsmography, and is shown to offer some advantages. The origin of the MSPG signal is

theoretically analyzed, and when a fixed cardiac magnetic dipole model is used, overall change in cardiac volume as a function of time is evaluated with reasonable accuracy when the proximity effect of the torso is taken into account. D.L.G.

A82-17570 **Dipole localization of average and single visual evoked potentials.** R. W. Sencaj and J. I. Aunon (Purdue University, West Lafayette, IN). *IEEE Transactions on Biomedical Engineering,* vol. BME-28, Jan. 1982, p. 26-33. 30 refs. Grant No. NIH-NS-15347.

A single dipole source was chosen as a model of the neurological generator of evoked potentials elicited by illuminated checkerboard stimulation of halves and quadrants of the visual field, and a homogeneous sphere was chosen as a model for the head. Dipole locations and moments were calculated for the average evoked potentials and average dipole locations and moments were calculated for the preprocessed single evoked potentials. The average dipole locations for the single potentials appear to be more anatomically appropriate than the location due to the average evoked potentials. A relationship was demonstrated between the dipole parameters and polarity inversions in the average evoked potentials. (Author)

A82-17571 **Human vertical fusional response under open and closed loop stimulation to predictable and unpredictable disparity presentations.** A. L. Perlmutter and A. E. Kertesz (Northwestern University, Evanston, IL). *IEEE Transactions on Biomedical Engineering,* vol. BME-29, Jan. 1982, p. 57-61. 10 refs. Grant No. NIH-EY-1055.

A82-17620 **The mass extinctions of the late Mesozoic.** D. A. Russell (National Museum of Natural Sciences, Ottawa, Canada). *Scientific American,* vol. 246, Jan. 1982, p. 58-65.

Geologic evidence for a celestial body impact with earth at the end of the Mesozoic period is examined. Dinosaur fossils are noted to be present in the strata of the immediately preceding, Cretaceous, period, and absent from the later Mesozoic period. A world-wide thin layer of iridium-enriched clay has been found in the Mesozoic layer, and iridium is noted to be present in greater abundances in meteorites than in the earth's crust. Both marine cores and continental samples of the same epoch have displayed the iridium anomaly, and it is estimated that 500 billion tons of matter were deposited on the earth in one instant. Possible extra-solar system origins of the material are discussed in the light of the iridium-isotope abundance ratio of the layer being the same as that of solar system materials. The sequence of species extinction is examined from the fossil record, and it is determined that no land animal weighing more than 55 lb survived the period in question. M.S.K.

A82-17940 # **Human orientation in space.** L. R. Young (MIT, Cambridge, MA). *American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 20th, Orlando, FL, Jan. 11-14, 1982, Paper 82-0422.* 10 p. 7 refs.

The usefulness of platform motion in flight simulators and the problem of space motion sickness are discussed. Human spatial orientation is defined as a perception of linear position and angular orientation, as well as their rates of change. The semicircular canals in the vestibular system provide angular acceleration information, while the otoliths are the inertial balance organs, sensing acceleration in three dimensions. Minute accelerations, such as head turning, in a weightless environment, can give rise to a false sense of a gravity field. Simulator movement is asserted to involve a compromise between visual cues and vestibular perception, the latter being a significant indicator for experienced pilots; levels of motion sufficient to excite the semicircular canals are given as 0.2 deg/sec per sec, minimum. Research to define predictors, preflight habituation training, and in-flight prevention of space motion sickness is indicated, noting that current theory holds that a sensory conflict precipitates the onset of space motion sickness. (Author)

A82-18024 **How do we avoid confounding the direction we are looking and the direction we are moving.** D. Regan and K. I. Beverley (Dalhousie University, Halifax, Canada). *Science,* vol. 215, Jan. 8, 1982, p. 194-196. 9 refs. Research supported by the Natural Sciences and Engineering Research Council of Canada; Grant No. AF-AFOSR-78-3711.

Contrary to a previous assumption, the center of the expanding pattern of visual flow is not generally useful as an aid in judging the direction of self motion since its direction depends on the direction of gaze. For some visual environments, however, the point of maximum rate of change of magnification in the retinal image coincides with the direction of self motion, independently of the direction of gaze. This visual indicator could be used to judge the direction of self motion. (Author)

A82-18325 **Effects of task feedback and stringency of external pacing on mental load and work performance.** J. L. Knight and G. Salvendy (Purdue University, West Lafayette, IN). *Ergonomics,* vol. 24, Oct. 1981, p. 757-764. 5 refs. NSF Grant No. APR-77-17695.

Sixteen subjects were used to study the effects of two levels of pacing constraint and four performance feedbacks on the performance and mental load associated with a manual task. The following main conclusions emerged: (1) performance feedback reduces the mental load of the task only when the pacing constraint is low and (2) feedback improves task performance when the pacing constraint is low since operators are able to meet work requirements more closely. Feedback, however, does not improve the performance or reduce the mental load of a highly paced task. (Author)

A82-18402 * **Fabrication and wear test of a continuous fiber/particulate composite total surface hip replacement.** J. C. Roberts, W. R. Jones, Jr. (NASA, Lewis Research Center, Cleveland, OH), and F. F. Ling (NASA, Lewis Research Center Cleveland OH; Rensselaer Polytechnic Institute, Troy, NY). *American Society of Lubrication Engineers and American Society of Mechanical Engineers, Lubrication Conference, New Orleans, LA, Oct. 5-7, 1981, ASLE Preprint 81-LC-2D-1.* 9 p. 28 refs. Grant No. DAAG29-79-C-0204.

A82-18523 † **Study of the discrimination capacity of the auditory analyzer in flight personnel (K izucheniiu razreshaiushchei sposobnosti slukhovogo analizatora u letnogo sostava).** A. S. Gusarov. *Voenno-Meditsinskii Zhurnal,* Nov. 1981, p. 44, 45. In Russian.

Thresholds for the perceptual masking of an auditory signal by noise and differential sensitivity to changes in the frequency and duration of a tonal stimulus are determined by the use of three prerecorded programs in flight personnel suffering from incipient bilateral cochlear neuritis, hypertonic neurocirculatory distonia, phase I hypertension emotional-autonomic instability, incipient bilateral cochlear neuritis in combination with emotional-autonomic instability and cerebro-vascular sclerosis. The differential frequency sensitivity threshold is found to be elevated in individuals with incipient cerebro-vascular sclerosis, hypertension and emotional-autonomic instability, while the incipient stages of cochlear neuritis do not worsen the noise stability or differential sensitivity of the auditory analyzer. The most informative indicator of the functional conditions of the auditory analyzer and central nervous system is found to be the differential sensitivity to tonal frequency changes, and it is recommended that assessment of this sensitivity by a method of constant stimulus differences be further developed for use in the clinical evaluation of air crew. A.L.W.

A82-18524 † **The work capacity of sailors under conditions of varying work-rest cycles (Rabotosposobnost' moriakov v usloviiakh izmenennogo rezhima truda i otdykha).** V. N. Evstaf'ev, L. M. Shafran, and O. Iu. Netudykhatka. *Voenno-Meditsinskii Zhurnal,* Nov. 1981, p. 46, 47. 8 refs. In Russian.

A82-18525 † **The role of physical training in the prevention of ischemic heart disease (Rol' fizicheskikh trenirovok v profilaktike ishemicheskoi bolezni serdtsa).** T. V. Khutiev. *Voenno-Meditsinskii Zhurnal,* Nov. 1981, p. 51-53. In Russian.

A82-18661 † **The effects of hypokinesia on the spectral characteristics of free amino acids in the skeletal muscles and the blood (Vliianie gipokinezii na spektral'nuiu kharakteristiku svobodnykh aminokislot skeletnoi myshtsy i krovi).** B. M. Kurtser. In: Pathological physiology of certain extreme states (Patologicheskaia fiziologiia nekotorykh extremal'nykh sostoianii). Kishinev, Izdatel'stvo Shtiintsa, 1980, p. 73-78. 7 refs. In Russian.

Free amino acid compositions in the skeletal muscles and blood plasma at various stages of hypokinesia and readaptation to free motion are investigated in rats maintained in specially designed cells for periods of 10, 15 and 28 days. Analyses reveal a net decrease in

total amino acid contents in the blood throughout the observational period, however an increase in skeletal muscle amino acid contents relative to initial levels by the 28th day of motion deprivation. The greatest decrease in amino acid contents in both organs is observed on the 15th day of the experiment. The results may be explained by the conversion of the plastic material represented by the free amino acids into energy substrates by the breakdown of proteins in the major organs in order to meet the increased energy requirements of the organism under stress. A.L.W.

A82-18662 † Free amino acid concentrations in the livers of animals subjected to certain extremal factors (O kontsentratsii svobodnykh aminokislot v tkani pecheni zhivotnykh pri vozdeistvii na organizm nekotorykh ekstremal'nykh faktorov). B. M. Kurtser, M. Ia. Anestiadi, and I. A. Nastas. In: Pathological physiology of certain extreme states (Patologicheskaia fiziologiia nekotorykh extremal'nykh sostoianii). Kishinev, Izdatel'stvo Shtiintsa, 1980, p. 78-84. 9 refs. In Russian.

Measurements are presented of changes in the concentrations of free amino acids in the liver in response to visceral shock, strangulated intestinal blockage and hypokinesia. Visceral trauma induced by intestinal eventration in rats is found to lead to an elevation in liver total amino acid contents, although methionine + valine, cysteine and aspartic acid + serine levels fell. Upper strangulated intestinal blockage in dogs and hypoxia for up to 28 days in rats, on the other hand, are observed to lead to significant decreases in total free liver amino acid contents, and in individual amino acid contents with the exception of methionine + valine in both situations and phenylalanine, histidine and agrinine in hypokinesia. The elevation in total liver amino acid contents in visceral shock is attributed to a preponderance of catabolic processes over anabolic due to the greater stimulation of the sympathetic nervous system than the parasympathetic, while the decrease observed upon blockage is explained by intoxication effects and that caused by hypokinesia is related to liver atrophy and the use of amino acids as energy substrates. A.L.W.

A82-18684 * Estimating cell populations. B. S. White and K. R. Castleman (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA). *Pattern Recognition,* vol. 13, no. 5, 1981, p. 365-370. Grant No. NIH-CB-70314; Contract No. NAS7-100.

An important step in the diagnosis of a cervical cytology specimen is estimating the proportions of the various cell types present. This is usually done with a cell classifier, the error rates of which can be expressed as a confusion matrix. We show how to use the confusion matrix to obtain an unbiased estimate of the desired proportions. We show that the mean square error of this estimate depends on a 'befuddlement matrix' derived from the confusion matrix, and how this, in turn, leads to a figure of merit for cell classifiers. Finally, we work out the two-class problem in detail and present examples to illustrate the theory. (Author)

A82-18699 † Functional model of the temporal and amplitude characteristics of the cardiac electric field (Funktsional'naia model' vremennykh i amplitudnykh kharakteristik elektricheskogo polia serdtsa). A. I. Davlet'iants, S. M. Makeev, and A. A. Popov (Akademiia Nauk Ukrainskoi SSR, Institut Kibernetiki, Kievskii Institut Inzhenerov Grazhdanskoi Aviatsii, Kiev, Ukrainian SSR). *Kibernetika i Vychislitel'naia Tekhnika,* no. 52, 1981, p. 29-33. 9 refs. In Russian.

A functional model of the generation of the temporal and amplitude characteristics of the cardiac electric field is presented which may be used in the analysis of the structure of cardiac contractions during operator adaptation to various stresses. The model considers the electrical field of the contracting heart to be a superposition of the electric fields generated by the sources of the electro-cardiographic P wave, QRS complex and T wave, which are in turn stimulated by a single self-excited excitation pulse generator connected by delay lines to the respective sources. External loads are assumed to act on the temporal and amplitude characteristics of all components of the model. Possible applications of such a model include the identification of the degree of physiological stress and cardiovascular condition of aircraft system operators. A.L.W.

A82-18700 † Problems of the regulation of hemodynamics during a passive orthostatic test - Study of a mathematical model (Nekotorye voprosy reguliatsii gemodinamiki vo vremia passivnoi ortostaticheskoi proby - Issledovanie na matematicheskoi modeli). R. D. Grigorian (Akademiia Nauk Ukrainskoi SSR, Institut Kibernetiki, Kiev, Ukrainian SSR). *Kibernetika i Vychislitel'naia Tekhnika,* no. 52, 1981, p. 89-93. 17 refs. In Russian.

The interactions of cardiac and vascular mechanisms and increases in skeletal muscle tonus in the hemodynamic response to passive orthostatic testing are investigated by the use of a mathematical model of the circulatory system. The response of the model, in which hemodynamic regulation occurs in response to the mismatch between a set point and the outputs of aortic and carotid baroreceptors, to the changes in heart rate, cardiac inotropic coefficient, peripheral resistance, circulatory dead volume and venous tension in the lower half of the body, was calculated in the absence of cardiovascular regulation, in the presence of normal regulation, in the presence of regulation by only the cardiac component, in the presence of regulation by the vascular component alone, and by a limited variation in vascular tonus. Time variations of aortic pressure, aortic blood flow and central venous pressure indicate that while the cardiac component is insufficient to maintain hemodynamic parameters, it acts to minimize the magnitude and duration of hemodynamic disturbances, with the vascular component responsible for the virtual constancy of aortic pressure. Results also demonstrate the necessary contributions of extramural pressure in the leg and trunk muscles to the maintenance of aortic pressure. A.L.W.

A82-18733 Recent life change measurement in Canadian Forces pilots. P. M. McCarron and N. H. Haakonson (Department of National Defence, Ottawa, Canada). *(Joint Committee on Aviation Pathology, Scientific Session, 12th, Halton, Bucks., England, Oct. 14-16, 1980.) Aviation, Space, and Environmental Medicine,* vol. 53, Jan. 1982, p. 6-13. 27 refs.

The development of a stress measurement data base to identify accident-prone aviators is reported. One group of 158 pilots and two control groups of nonaviators totalling 173 individuals answered questionnaires which referred to recent changes in health, work, family, social, and financial personal areas. The Life Change Units obtained were compared among personnel from different Canadian air bases and between pilots and nonpilots. It was determined that less than a 0.02 probability existed that the differences between the scores of the aviators and the nonpilots were due to chance. It is concluded that although further data are needed to equate the Life Change Units with specific levels of stress, the tests did indicate that pilots are in a high risk profession, and the sources are high enough to imply that over 50% of the pilots are subject to health changes. M.S.K.

A82-17434 Binocular counterrolling in humans with unilateral labyrinthectomy and in normal controls. S. G. Diamond and C. H. Markham (California, University, Los Angeles, CA). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 69-79. 15 refs.

A82-17435 * Ocular torsion on earth and in weightlessness. L. R. Young, B. K. Lichtenberg, A. P. Arrott, T. A. Crites, C. M. Oman, and E. R. Edelman (MIT, Cambridge, MA). *(Barany Society and New York Academy of Sciences, International Meeting on Vestibular and Oculomotor Physiology, New York, NY, Sept. 22-25, 1980.) New York Academy of Sciences, Annals,* vol. 374, Nov. 6, 1981, p. 80-92. 16 refs. Grant No. NsG-2032; Contract No. NAS9-15343.

Otolith function is studied by means of measurements of ocular torsion under various acceleration environments on earth and in weightlessness. Photographic measurements of ocular torsion as indicated by the rotation of landmarks on the iris with respect to head-fixed fiducial marks were obtained in subjects undergoing horizontal linear acceleration in a ground-based version of the space sled, lateral acceleration from weightlessness during pullout from the free-fall portion of parabolic flight, and optokinetic stimulation about the roll axis in the supine position in the laboratory and during weightlessness. The responses of ocular torsion to horizontal acceleration are in agreement with a simple low-order linear system with a dominant time constant of 0.33 sec, with a transfer function fit by a model with a pure delay of 0 to 400 msec and a first-order lag. In the

pullout experiment, torsion was not observed in response to the onset of acceleration in the right-ear-down position, although it was present in response to the lateral stimulus. Results of the roll vection experiments indicate the independence of ocular torsion and visually induced tilt. In addition, an automatic video system using a soft contact lens target is presented which has been developed for ocular torsion measurements. A.L.W.

A82-18736 Check your oxygen. K. E. Underwood Ground (RAF, Institute of Pathology and Tropical Medicine, Halton, Bucks., England). *(Joint Committee on Aviation Pathology, Scientific Session, 12th, Halton, Bucks., England, Oct. 14-16, 1980.) Aviation, Space, and Environmental Medicine,* vol. 53, Jan. 1982, p. 24-26.

The history of the crash of a Beechcraft Air 200 aircraft is dissected for causes. The pilot had radioed for permission for emergency descent, was acknowledged, the plane began a circular approach, and then communications broke off. The plane circled the airport 36 times and then crashed. Subsequent autopsy of the uncremated remains revealed a reported probable cause of death of hypoxia. The cabin was noted to have a 'dump atmosphere' switch, which may have been activated at 10,000 ft, while oxygen masks were set to deploy only above 12,500 ft. It was also found that the oxygen masks delivered only 47% oxygen concentration while in use. Recommendations are given for a total oxygen system check-out before each flight, including donning the oxygen masks to ensure that they deliver oxygen. M.S.K.

A82-18737 Forensic dentistry. W. M. Morlang (USAF Hospital, New York, NY). *Aviation, Space, and Environmental Medicine,* vol. 53, Jan. 1982, p. 27-34. 20 refs.

The specialty of forensic dentistry is examined and its role in the multidisciplinary investigation of the identity of aircraft accident fatalities is addressed. State-of-the-art techniques are discussed including professional procedures and organization, radiology, documentation, and data automation. A unique procedure for courtroom presentation of identification confirmation dental radiographs is provided. The increased utilization of forensic dentistry within aviation pathology is encouraged. (Author)

A82-18738 Piribedil-induced anti-hypoxic protection in rats. C. Saligaut, N. Moore, M. Daoust, P. Chretien, and F. Boismare (Rouen, Université, Saint-Etienne-du-Rouvray, Seine-Maritime, France). *Aviation, Space, and Environmental Medicine,* vol. 53, Jan. 1982, p. 35-39. 16 refs.

The action of the dopaminergic agonist, piribedil, on a conditioned avoidance response was studied in normoxic or hypobaric hypoxic rats. This agonist has no effects in normoxia, but induces an anti-hypoxic protection (improvement of learning in hypoxia), antagonized by low doses of pimozide. The mechanism of the anti-hypoxic property seems to be mediated by the stimulation of the postsynaptic dopaminergic receptors, but does not exclude the role of noradrenergic pathways, as shown by the stabilization of norepinephrine levels during hypoxia after treatment with piribedil. (Author)

A82-18739 The effect of acetazolamide on the proteinuria of altitude. A. R. Bradwell (Birmingham, University, Birmingham, England) and J. P. Delamere (Queen Elizabeth Medical Centre, Birmingham, England). *Aviation, Space, and Environmental Medicine,* vol. 53, Jan. 1982, p. 40-43. 11 refs. Research supported by the Arthur Thomson Trust Fund, West Midlands Regional Health Authority, and Lederle Pharmaceuticals.

Albumin was measured by dipstick tests and immunologically in 24-h and early morning urine samples collected from 20 subjects during a high-altitude trek. Each was given acetazolamide (Diamox sustets) or placebo as part of a double-blind trial on the prophylactic use of acetazolamide in acute mountain sickness (AMS). At the highest altitudes, albuminuria was six times greater in those on placebo and was related to the clinical features of AMS and arterial oxygen tension. Urine dipstick tests for proteinuria were also an index of AMS, but were inaccurate. The proteinuria is probably due to renal hypoxia, which causes increased glomerular permeability, reduced tubular readsorption, or both. The reduction in the clinical features of AMS achieved with acetazolamide therapy is also associated with improved renal function. (Author)

A82-18740 Effect of altitude exposure on induction of Streptococcal endocarditis in young and middle-aged rats. P. D. Altland (National Institutes of Health, Laboratory of Chemical Physics, Bethesda, MD). *Aviation, Space, and Environmental Medicine,* vol. 53, Jan. 1982, p. 44-48. 24 refs.

A82-18741 * Visual scanning behavior and mental workload in aircraft pilots. J. R. Tole, R. L. Harris, Sr. (MIT, Cambridge, MA), A. T. Stephens (NASA, Langley Research Center, Flight Management Branch, Hampton, VA), and A. R. Ephrath (Bell Telephone Laboratories, Inc., Piscataway, NJ). *Aviation, Space, and Environmental Medicine,* vol. 53, Jan. 1982, p. 54-61. 21 refs. Grant No. NCC1-23.

This paper describes an experimental paradigm and a set of preliminary results which demonstrate a relationship between the level of performance on a skilled man-machine control task, the skill of the operator, the level of mental difficulty induced by an additional task imposed on the basic control task, and visual scanning performance. During a constant, simulated piloting task, visual scanning of instruments was found to vary as a function of the level of difficulty of a verbal loading task. The average dwell time of each fixation on the pilot's primary instrument increased as a function of the loading. The scanning behavior was also a function of the estimated skill level of the pilots, with novices being affected by the loading task much more than experts. The results suggest that visual scanning of instruments in a controlled task may be an indicator of both workload and skill. (Author)

A82-18742 Measurement of systolic time intervals by electrical plethysmography - Validation with invasive and noninvasive methods. J. Colin (Service de Santé des Armées, Centre de Recherches, Clamart, Hauts-de-Seine, France) and J. Timbal (Centre d'Etudes et de Recherches de Médecine Aérospatiale, Paris, France). *Aviation, Space, and Environmental Medicine,* vol. 53, Jan. 1982, p. 62-68. 15 refs.

A82-18743 Surgical treatment of recurrent frontal sinus barotrauma - A case report. D. M. Barrs and F. W. Shagets (USAF, Medical Center, Lackland AFB, TX). *Aviation, Space, and Environmental Medicine,* vol. 53, Jan. 1982, p. 69-71. 13 refs.

It is noted that surgery is indicated in patients developing chronic documented frontal sinusitis despite medical therapy. Attention is called to the difficulty of treating flyers who do not develop chronic sinusitis but who have recurrent episodes of barotrauma-induced frontal sinusitis. It is thought that in some of these cases a ventilatory procedure is indicated. The recurrent history should first be well documented with X-rays showing the acute barosinusitis and convalescent X-rays showing interval clearing. Patients selected should not have other underlying or predisposing pathology, such as allergic or vasomotor rhinitis. The problem should be isolated to the frontal sinus and not be a component of pansinusitis. It is noted that unilateral involvement is preferable. Ventilation may then be obtained by combining naso-frontal reconstruction with intersinus septectomy. After the operation, an altitude-chamber flight is desirable before a return to flying. This could be accomplished after removing the rolled silastic sheeting. C.R.

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STAR ENTRIES

N82-14793 Emory Univ., Atlanta, Ga.
STUDIES IN IN VIVO ELECTROCHEMISTRY Ph.D. Thesis
Wayne Stuart Lindsay 1981 303 p
Avail: Univ. Microfilms Order No. 8124252

The design and construction of instrumentation for in vivo electrochemistry, solution and in vivo characterization of microworking electrodes, the use of the multielectrode system for pharmacological and behavioral studies, statistical analysis of data, simulation studies, and the first chronoamperometric recording from a rhesus monkey are presented. In vivo data using different values for some of the experimental parameters in the simulation equation were compared to simulated data. Chronoamperometric recordings were made from the brain of an unanesthetized rhesus monkey. The electrochemical signal increased during emotional excitation and feeding. Dissert. Abstr.

N82-14794*# National Aeronautics and Space Administration, Washington, D. C.
POLYPLOIDIZATION DELAY IN RAT HEPATOCYTES UNDER LIVER GROWTH INHIBITION BY HYPOKINESIA
V. M. Faktor, V. F. Malyutin, S. Y. Li, and V. Ya. Brodskiy Jul. 1981 10 p refs Transl. into ENGLISH from Tsitologiya (USSR), v. 21, no. 4, 1979 p 397-400
(Contract NASw-3199)
(NASA-TM-76515) Avail: NTIS HC A02/MF A01 CSCL 06C

A study of young rats, weighing 55 to 59 g, after being for 10 days in conditions of limited mobility, shows a retardation of body growth as well as that of liver growth. The decrease in the rate of growth is accompanied by a reduction of cell proliferation and by delay polyploidization of hepatocytes in the liver of experimental rats. The materials, methods, and results of research are discussed. M.D.K.

N82-14795# Jackson Lab., Bar Harbor, Maine.
INBORN ANEMIAS IN MICE Progress Report, 1 Aug. 1980 - 1 Jun. 1981
Seldon E. Bernstein, Jane E. Barker, and Elizabeth S. Russell Jun. 1981 36 p
(Contract DE-AC02-76EV-03264)
(DE81-029128; DOE/EV-03264/20) Avail: NTIS HC A03/MF A01

Four macrocytic anemias, five hemolytic anemias, nonhemolytic microcytic anemia, transitory siderocytic anemia, sex-linked iron-transport anemia, an alpha-thalassemia, and a new target-cell anemia were studied. Each of these blood dyscrasias is caused by the action of a unique mutant gene, which determines the structure of different intracellular molecules, and thus controls a different metabolic process. The potential for uncovering different aspects of hemopoietic homeostatic mechanisms in the mouse is considered. Each anemia is studied through: (1) characterization of peripheral blood values, (2) determinations of radiosensitivity under a variety of conditions, (3) measurements of iron metabolism and heme synthesis, (4) histological and biochemical study of bloodforming tissue, (5) functional tests of the stem cell component, (6) examination of responses to erythroid stimuli, and (7) transplantation of tissue between individuals of differently affected genotypes. DOE

N82-14796# Southwest Research Inst., San Antonio, Tex.
PLAN OF ACTION AND MILESTONES FOR NAVY COMBUSTION TOXICITY Final Report
R. E. Adler, H. Kaplan, and M. D. Pish 1 Jan. 1981 33 p
(Contract N00173-80-C-0125)
(AD-A105623) Avail: NTIS HC A03/MF A01 CSCL 13/10

This report reviews the Workshop on Toxicology of Combustion Products held at the Naval Research Laboratory on 15-16 October 1980. Participants included U.S. Navy, other government activities, and U.S. Industry. The use of plastic materials has become more prevalent in the design of equipment and in shipboard construction. Use of these materials in quantity can create severe generation of toxic gases which can incapacitate or kill personnel in shipboard fires even if they are not in the immediate fire area. Author (GRA)

N82-14797# Mitre Corp., McLean, Va.
EVALUATION OF SHORT-TERM BIOASSAYS TO PREDICT FUNCTIONAL IMPAIRMENT. SELECTED SHORT-TERM PULMONARY TOXICITY TESTS Final Report, Sep. 1978 - Jul. 1980
Steve Drill and Richard Thomas Oct. 1980 131 p refs
(Contract DAMD17-78-C-8068)
(AD-A103766; MTR-80W00233) Avail: NTIS HC A07/MF A01 CSCL 06/20

Short term bioassays which demonstrate ability to assess and predict impairment of the pulmonary system resulting from exposure to chemicals were evaluated. Test procedured for determining toxic effects on the lungs and other components of the plumonary system are reviewed. The procedures are discussed in sections on morphology, respiratory mechanics, gas exchange, circulation, defense mechanisms and biochemistry. Author

N82-14798# Mitre Corp., McLean, Va.
EVALUATION OF SHORT-TERM BIOASSAYS TO PREDICT FUNCTIONAL IMPAIRMENT. DEVELOPMENT OF PULMONARY BIOASSAYS IN SMALL ANIMALS: DIRECTORY OF INSTITUTIONS; INDIVIDUALS INVOLVED IN UTILIZATION Final Report
Steve Drill, Richard Thomas, and Terry Zimmerman Oct. 1980 133 p
(Contract DAMD17-78-C-8068)
(AD-A103767; WP-79W00222) Avail: NTIS HC A07/MF A01 CSCL 06/20

Short term bioassays which demonstrated ability to evaluate and predict pulmonary impairment resulting from toxicant exposures were evaluated. This directory describes available pulmonary testing protocols and assesses their suitability for a screening program. Organizations currently engaged in pulmonary bioassay utilization or development are catalogued and information concerning specific measurements performed, test systems employed, compounds tested, requirements for anesthesia and terminal nature of the test are provided. Author

N82-14799# Oak Ridge National Lab., Tenn. Industrial Safety and Applied Health Physics Div.
INTDOS: A COMPUTER CODE FOR ESTIMATING INTERNAL RADIATION DOSE USING RECOMMENDATIONS OF THE INTERNATIONAL COMMISSION ON RADIOLOGICAL PROTECTION
M. T. Ryan Sep. 1981 25 p refs
(Contract W-7405-eng-26)
(DE82-000507; ORNL/TM-7928) Avail: NTIS HC A02/MF A01

A user oriented computer code, INTDOS, to calculate estimates of internal radiation dose commitment resulting from the acute inhalation intake of various radionuclides was designed. The user must identify the radionuclide name, solubility class, particle size, time since exposure, and the measured lung burden. The INTDOS calculates the fraction of the lung burden remaining at time, t, postexposure considering the solubility class and particle size information. Effective committed dose equivalents to various organs and tissues of the body are calculated using inhalation committed dose factors. DOE

N82-14800# Brookhaven National Lab., Upton, N. Y. Biology Dept.
REPAIR OF RADIATION DAMAGE IN MAMMALIAN CELLS
R. B. Setlow 1981 16 p refs Presented at the NATO CNEN Conf., Rome, 24 Aug. 1981.
(Contract DE-AC02-76CH-00016)
(DE81-030824; BNL-30056; B10-3766; CONF-810873-2)
Avail: NTIS HC A02/MF A01

The responses as survival, mutation, and carcinogenesis, of mammalian cells and tissues to radiation which are dependent not only on the magnitude of the damage to macromolecular structures (DNA, RNA, protein, and membranes) but on the rates of macromolecular syntheses of cells relative to the half lives of the damages are discussed. Cells possess a number of mechanisms for repairing damage to DNA. The effects of radiation and the

repair of radiation damage can be explained by epidemiological data which allows the construction of dose response curves for humans. The shapes of such curves or the magnitude of the response depends on repair. Radiation damage is emphasized because: (1) radiation dosimetry is excellent compared to chemical dosimetry; (2) a number of cancer prone diseases show defects in DNA repair and radiation results in more chromosomal damage in cells from such individuals than in cells from normal individuals; (3) specific radiation products in DNA have been correlated with biological effects, and (4) many chemical effects seem to mimic radiation effects. It is indicated that damages to DNA can be the initiating events in carcinogenesis. DOE

N82-14801# Michigan Research Center, Inc., East Lansing.
EVALUATIVE STUDIES IN NUCLEAR MEDICINE RESEARCH. EMISSION-COMPUTED TOMOGRAPHY ASSESSMENT Progress Report, 1 Jan. - 15 Aug. 1981
E. James Potchen 15 Aug. 1981 18 p refs
(Contract DE-AS02-76EV-02777)
(DE81-030168; DOE/EV-02777/5) Avail: NTIS HC A02/MF A01

Imaging performance goals which need to be met to produce effective biomedical research using positron emission computer tomography are discussed. The realization of those performance goals by imaging systems, and the dependence of currently unachieved performance goals on design an operational factors along with refinement of economic estimates for the capital and operating costs of a research facility are addressed. DOE

N82-14802# Cornell Univ., Ithaca, N. Y. Materials Science Center.
FIELD-ION-MICROSCOPE OBSERVATIONS OF RADIATION EFFECTS
David N. Seidman Aug. 1981 8 p refs
(Contract DE-AS02-76ER-03158)
(DE81-030934; DOE/ER-03158/99; MSC-4555) Avail: NTIS HC A02/MF A01

The unique advantages and capabilities of the field ion microscope (FIM) and atom probe FIM for the study of the effects of particle radiation on metals are reviewed. Some contrast effects caused by radiation induced defects are discussed. DOE

N82-14803# Battelle Pacific Northwest Labs., Richland, Wash.
CARCINOGENIC EFFECTS OF COAL-CONVERSION MATERIALS
R. A. Renne and L. G. Smith Apr. 1981 29 p refs Presented at the Ind. Hyg. and Occupational Med. in Coal Conversion Proj. Workshop, Washington, D.C., 7 Nov. 1980 Submitted for publication
(Contract DE-AC06-76RL-01830)
(DE81-028108; PNL-SA-9516; CONF-801143-2) Avail: NTIS HC A03/MF A01

The correlation between mutagenesis and carcinogenesis data on complex mixtures (synfuel materials) was determined. The heavy distillate is highly mutagenic compared with the other materials tested and it was also highly carcinogenic in a mouse skin painting assay. The fractions, we give different results from those of the mutagenesis assays. The basic tar and the neutral tar skin carcinogenesis data correlate fairly well with the mutagenesis data. The need for caution against depending heavily on equating PNA content with carcinogenic activity is emphasized. It is recommended that primary aromatic amines are also monitored. DOE

N82-14804*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INFLUENCE OF DISPLAY AND CONTROL COMPATIBILITY ON PILOT-INDUCED OSCILLATIONS
Marvin C. Waller, Randall L. Harris, Sr., and Lee H. Person, Jr. Dec. 1981 40 p refs
(NASA-TP-1936; L-14364) Avail: NTIS HC A03/MF A01 CSCL 05I

The differences in techniques used by seven pilots to acquire information from an advanced display for instrument approaches to and landings on a runway were investigated. A fixed base simulator programmed with dynamics resembling the terminal configured vehicle (TCV) was studied. It is shown that the seven pilots can be divided into two groups which used the display with distinctly different strategies for controlling the airplane. A related pattern of performance differences resulted. It is found that pilots who primarily use raw flight path information experience longitudinal oscillations while pilots using attitude information did not. E.A.K.

N82-14805# Fabrique Nationale d'Armes de Guerre, Herstal-les-Liege (Belgium).
INITIATION INTO THE UTILIZATION OF PROGRAMMABLE INDUSTRIAL ROBOTS: GRAFCET [INITIATION A L'UTILISATION DES AUTOMATES PROGRAMMABLES INDUSTRIELS]
P. Krzesinski Mar. 1981 25 p refs In FRENCH
Avail: NTIS HC A02/MF A01

A technique for expressing automation problems, i.e., graph of command stage and transition (GraFcet), is presented. It is intended as a methodological tool which aids in the communication of automated systems specifications between client and contractor. The language GraFcet comprehends two levels of specification. The first level describes the behavior of the command part of a system in relation to the operating part (functional specifications). The second level sets technological and environmental specifications with which the command part of a system must operate (operational specifications). Fundamental notions and the practical use of GraFcet are explained. Author (ESA)

N82-15708*# National Aeronautics and Space Administration, Washington, D. C.
USSR SPACE LIFE SCIENCES DIGEST Annual Summary
Courtland S. Lewis, ed. and Kristy L. Donnelly, ed. 1980 72 p refs Prepared jointly with BioTechnology, Inc., Arlington, Va.
(Contract NASw-3469)
(NASA-TM-84080) Avail: NTIS HC A04/MF A01 CSCL 06C

Research in exobiology, life sciences technology, space biology, and space medicine and physiology, primarily using data gathered on the Salyut 6 orbital space station, is reported. Methods for predicting, diagnosing, and preventing the effects of weightlessness are discussed. Psychological factors are discussed. The effects of space flight on plants and animals are reported. Bioinstrumentation advances are noted. R.J.F.

N82-15709*# George Washington Univ., Washington, D.C. Dept. of Medical and Public Affairs.
A COMPENDIUM OF HYPOKINETIC AND HYPODYNAMIC ANIMAL STUDIES Contractor Report, Dec. 1981
Linda G. Pleasant and Phyllis T. Axelrod Washington NASA Dec. 1981 734 p
(Contract NASw-3165)
(NASA-CR-3485) Avail: NTIS HC A99/MF A01 CSCL 06C

This compendium organizes and summarizes the scientific literature dealing with the study of hypokinetic and hypodynamic animal studies. It includes both American and foreign research papers. Author

N82-15710*# Research Triangle Inst., Research Triangle Park, N. C.
NASA BIOMEDICAL APPLICATIONS TEAM. APPLICATIONS OF AEROSPACE TECHNOLOGY IN BIOLOGY AND MEDICINE Quarterly Report, Apr. - Jun. 1979
D. J. Rouse, R. Beadles, H. C. Beall, J. N. Brown, Jr., W. H. Clingman, M. W. Courtney, M. McCartney, R. W. Scearce, and B. Wilson Jun. 1979 60 p refs
(Contract NAS1-14708)
(NASA-CR-152663; RTI/1411/00-07Q) Avail: NTIS HC A04/MF A01 CSCL 06C

The use of a bipolar donor-recipient model of medical technology transfer is presented. That methodology is designed to: (1) identify medical problems and aerospace technology that in combination constitute opportunities for successful medical products; (2) obtain the early participation of industry in the transfer process; and (3) obtain acceptance by the medical community of new medical products based on aerospace technology. Problem descriptions and activity reports and the results of a market study on the tissue freezing device are presented. E.A.K.

N82-15711*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
STS-1 MEDICAL REPORT
Sam L. Pool, ed., Philip C. Johnson, Jr., ed., and John A. Mason, ed. Dec. 1981 114 p

(NASA-TM-58240; S-509) Avail: NTIS HC A06/MF A01 CSCL 06P

The report includes a review of the health of the crew before, during and immediately after the first Shuttle orbital flight (April 12-14, 1981). Areas reviewed include: health evaluation, medical debriefing of crewmembers, health stabilization program, medical training, medical kit carried inflight; tests and countermeasures for space motion sickness, cardiovascular profile, biochemistry and endocrinology results; hematology and immunology analyses; medical microbiology; food and nutrition; potable water; shuttle toxicology; radiological health; cabin acoustical noise. Also included is information on: environmental effects of Shuttle launch and landing, medical information management; and management, planning and implementation of the medical program.

N82-15712*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
EVALUATION OF CREW HEALTH
Craig L. Fischer and Joseph Degioanni *In its* STS-1 Med. Rept. Dec. 1981 p 5-6
Avail: NTIS HC A06/MF A01 CSCL 06P

The STS-1 pre- and postflight medical evaluations are presented. Exams included: audiometry; dental examination; laboratory microbiology; physical examination; cardiovascular stress tests, including 80% treadmill; stand test weight; tonometry; and visual examination. No significant clinical problem was identified postflight. Of interest medically was the expected hyperreflexia and dependent venous stasis exhibited by both crewmen. T.M.

N82-15713*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
INFLIGHT OBSERVATIONS
Michael A. Berry *In its* STS-1 Med. Rept. Dec. 1981 p 7-9

Avail: NTIS HC A06/MF A01 CSCL 06P

The monitoring was carried out by recording electrocardiogram (ECG) during prelaunch, launch, early orbit time, entry, and landing; monitoring crew voice transmission throughout the mission; and conducting a daily private crew medical communication. Crew performance is outlined. No medical problems of any kind were experienced by the crew. No medical treatment inflight was required except for the prophylactic use of an antimotion sickness medication that had been planned preflight. T.M.

N82-15714*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
CREW MEDICAL DEBRIEFING
Joseph Degioanni and Craig L. Fischer *In its* STS-1 Med. Rept. Dec. 1981 p 11-17

Avail: NTIS HC A06/MF A01 CSCL 06P

The postflight debriefings of the STS-1 astronauts are presented. The debriefings are presented as dialogues taken from the tape recording of the sessions. T.M.

N82-15715*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
HEALTH STABILIZATION PROGRAM
James K. Ferguson *In its* STS-1 Med. Rept. Dec. 1981 p 19-21

Avail: NTIS HC A06/MF A01 CSCL 06E

The objective of the HSP is to provide an environment surrounding the prime and backup crewmen which will reduce or eliminate the exposure of the crew to infectious agents. The program limited the access of large numbers of newspersons to the crew and enabled the identification and medical examination of all VIP's who visited the crew. Although several primary contacts were observed not wearing masks at required times, the great majority of primary contacts did wear masks. The STS-1 program effectively kept 38 known ill persons out of crew work areas and thereby prevented crew exposure and possible illness. T.M.

N82-15716*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
EMERGENCY MEDICAL SERVICES SYSTEM (EMSS)
Sam E. Pool *In its* STS-1 Med. Rept. Dec. 1981 p 23-27

Avail: NTIS HC A06/MF A01 CSCL 06E

The objective of the EMSS was to provide the ill or injured crewman with rapid access to the appropriate level of medical care. In order to meet the objective, the following factors were carefully considered in developing the EMSS for STS-1: accessibility to health care centers, personnel, training, experience, transportation, response times, communications, medical records, and special environmental hazards. The system is described along with flight surgeon staffing and deployment. T.M.

N82-15717*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
CREW MEDICAL TRAINING
James M. Vanderploeg *In its* STS-1 Med. Rept. Dec. 1981 p 29-30
Avail: NTIS HC A06/MF A01 CSCL 06E

Each astronaut's initial training in the medical disciplines occurred during the first year following selection. The medical curriculum encompassed approximately 16 hours of instruction during the year. The principal areas covered include: the central and peripheral nervous systems; the auditory and vestibular systems; the visual system; dental health; the cardiovascular system; the pulmonary system, gastrointestinal system, and genitourinary system; and the musculoskeletal system. For each of these areas the astronauts were taught the basics of anatomy and physiology. In addition, they were introduced to physical examination techniques, diagnosis, and treatment of the more common ailments of the different organ systems. T.M.

N82-15718*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SHUTTLE ORBITAL MEDICAL SYSTEM
James M. Vanderploeg *In its* STS-1 Med. Rept. Dec. 1981 p 31-35
Avail: NTIS HC A06/MF A01 CSCL 06E

The system was designed to provide treatment for life threatening emergencies and to permit diagnosis and treatment of all less severe injuries and illnesses. It is intended to sustain the medical needs of a two man crew for up to 7 days. The system is described and a detailed list of the equipment in the emergency medical kit is presented. The prescribed medical training in the performance of emergency procedures, the use of diagnostic equipment, the performance of therapeutic modalities, and the knowledge of the medical kits contents is discussed. T.M.

N82-15719*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
VALIDATION OF PREDICTIVE TESTS AND COUNTERMEASURES FOR SPACE MOTION SICKNESS
Jerry L. Homick *In* the STS-1 Med. Rept. Dec. 1981 p 37-38

Avail: NTIS HC A06/MF A01 CSCL 06E

Inflight observations, supported by a series of pre and postflight data collection procedures, on STS-1 crewmembers in an effort to validate ground based tests which may be predictive of susceptibility to the space motion sickness syndrome are presented. Crew procedures were implemented which enabled acquisition of data to be used in validating motion sickness countermeasures. T.M.

N82-15720*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
CREW CARDIOVASCULAR PROFILE
Michael W. Bungo *In its* STS-1 Med. Rept. Dec. 1981 p 39-45

Avail: NTIS HC A06/MF A01 CSCL 06P

Cardiovascular data was acquired in the operational mode of the flight. Heart rate and blood pressure responses are presented for each crewman. There were definable points in the mission which produce cardiovascular stress as measured by heart rate response. The stand test in both the PLT and CDR show evidence for a relative hypovolemia and perhaps a resetting of arterial regulation. The anti-G suit and G sub z acceleration effects are discussed. The anti-G suit proved to be a rather simple yet relatively effective device for increasing tolerance to +G sub z acceleration. The STS-1 flight profile produced no operationally significant alterations in G tolerance. T.M.

N82-15721*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
BIOCHEMISTRY AND ENDOCRINOLOGY RESULTS
Carolyn S. Leach *In its* STS-1 Med. Rept. Dec. 1981 p 47-49

Avail: NTIS HC A06/MF A01 CSCL 06P

Blood (plasma or serum) biochemistry findings show postflight decreases below preflight findings for uric acid triglycerides, and AST. Postflight increases above preflight values were observed in glucose, cholesterol, BUN, calcium phosphate, angiotensin I, aldosterone, insulin, T3, T4, HGH, ACTH and GGTP. It is suggested that special attention should be given to the fluid and electrolyte intake in the astronauts so that homeostatic perturbations are not consequential. T.M.

N82-15722*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

HEMATOLOGICAL AND IMMUNOLOGICAL ANALYSES

Gerald R. Taylor *In its* STS-1 Med. Rept. Dec. 1981 p 51-52 refs

Avail: NTIS HC A06/MF A01 CSCL 06P

The analyses conducted on the cellular blood components of the primary and backup crewmembers indicated that for the one month period preceding the flight, there were no unusual variations in the cellular blood components of the crewmembers. However, there were alterations in both of the primary crewmembers after the flight. The explanation is that there was a phase decrease in fluid volume. Concomitant with this fluid imbalance there is also evidence to support an absolute decrease in mean erythrocyte volume, a peripherial lymphopenia, and a marked decrease in blastogenic response of lymphocytes to in vitro mitogenic challenge. T.M.

N82-15723*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

MEDICAL MICROBIOLOGY OF CREWMEMBERS

Duane L. Pierson *In its* STS-1 Med. Rept. Dec. 1981 p 53-58

Avail: NTIS HC A06/MF A01 CSCL 06E

A surveillance program consisting of microbial monitoring of the flight crews (prime and backup) and the spacecraft (including surfaces, food, air and water) is described. Samples were obtained from the crews and the Orbiter at specified times and were evaluated by quantitating the number of microorganisms and identifying the pathogenic and potentially pathogenic microbes. Quantitative values for total microorganisms per sample site were relatively low both pre- and postlaunch except for three sites which exhibited some microbial buildup during the flight. The circulating air in the Orbiter displayed a sharp increase in the number of airborne bacteria and fungi immediately prior to launch. T.M.

N82-15724*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

FOOD AND NUTRITION

Richard L. Sauer and Rita M. Rapp *In its* STS-1 Med. Rept. Dec. 1981 p 59-62

Avail: NTIS HC A06/MF A01 CSCL 06H

The menu used during STS-1 is shown in terms of food items and food forms (irradiated, freeze-dried, or beverage). The estimated mean daily inflight nutrient consumption per crewman is presented. Recommended quantities of specific nutrients are reported. T.M.

N82-15725*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

THE POTABLE WATER

Richard L. Sauer *In its* STS-1 Med. Rept. Dec. 1981 p 63-66

Avail: NTIS HC A06/MF A01 CSCL 06K

Periodic samples of the potable water were obtained preflight and a series of samples were taken postflight to determine the continuing microbiological and chemical quality of the water. Those parameters of nonmedical concern which were exceeded included total organics and color. Other parameters included nickel concentration, total bacteria count, and chromium concentration levels. T.M.

N82-15726*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

SHUTTLE TOXICOLOGY

Wayland J. Rippstein *In its* STS-1 Med. Rept. Dec. 1981 p 67-75

Avail: NTIS HC A06/MF A01 CSCL 06T

Space flight toxicity standards and methods for control and evaluation of candidate spacecraft materials selection and/or use are described. The development of methods and hardware for removal of spacecraft contaminants is discussed. The analytical chemical data obtained from the two Orbiter vehicles (OV-101 and OV-102) were reviewed. The Enterprise (OV-101) is shown to be an extremely clean vehicle, whereas the Columbia (OV-102) outgassed a significant number and quantity of contaminant gases. T.M.

N82-15727*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

RADIOLOGICAL HEALTH

Charles M. Barnes *In its* STS-1 Med. Rept. Dec. 1981 p 77-78

Avail: NTIS HC A06/MF A01 CSCL 06R

Dosimeters were provided for development within the crew compartment and on the astronauts flight garments to detect radiation encountered by the space crew during the mission. The STS-1 mission encountered geomagnetically trapped electrons and protons on 13 low altitude passes through the South Atlantic anomaly. The orbital inclination was such that encounters with the outer belt horn was negligible. Radiation dose to the crew from the above events was estimated to be 5 millirad. Total PDL measured dose to the crew from all sources during the STS-1 mission was 20 millirad. T.M.

N82-15732# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).

FEASIBILITY STUDY (PHASE A) FOR A LIFE SCIENCE DOUBLE RACK ENVISAGED FOR THE SPACELAB MISSION D1 Final Report, Oct. 1980

Rolf Baur, Karl-Ludwig Bitzer, Helmut Preiss, and Peter Schiller Bonn Bundesministerium fuer Forschung und Technologie Sep. 1981 83 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie (BMFT-FB-W-81-037; ISSN-0170-1339) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 17.40

The lifescience double rack which is envisaged for a flight in the Spacelab mission D1 enables the performance of biomedical and botanical experiments. Besides experiment specific boxes, the double rack contains multi-user facilities like a standard botanical equipment, an oscilloscope and two centrifuges, furthermore stowage containers for auxiliary equipment. For late access and early retrieval equipment, stowage lockers in the middeck are available and in addition middeck freezers can be used during flight. A concept for the life science double rack was worked out including the flight and ground operations and the ground support equipment. Author

N82-15733# Erno Raumfahrttechnik G.m.b.H., Bremen (West Germany).

CONCEPT STUDY OF A LIFE SCIENCES PAYLOAD ELEMENT (PLE) FOR THE SL-D1 MISSION Final Report, Nov. 1980

Peter Junk, Heinrich Stegen, Wolfgang Haebel, and Manfred Ott Bonn Bundesministerium fuer Forschung und Technologie Oct. 1981 184 p refs Partly in GERMAN and ENGLISH Sponsored by Bundesministerium fuer Forschung und Technologie (BMFT-FB-W-81-038; ISSN-0170-1339) Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 34.70

Twelve life sciences experiments were selected as candidates for the Spacelab (SL)-D1 mission. They are combined to form a payload element (PLE). Experiment requirements were analyzed and completed, and technical concepts for the PLE were proposed. Interfaces were defined and missions assurance, operational, testing, and ground support aspects were considered. Most of the experiment requirements are within the capability which is supplied by the Space Transportation System, except the total stowage volume required for sample stowage in the orbiter mid deck. Also crew time is a critical parameter. The technical design concepts of the experiments are based on first Spacelab payload hardware or on existing commercial equipment, which has to be modified for SL. For realizing the SL-PLE, 32 months were estimated, starting from a definition phase. M.G.

N82-15734# Istituto Superiore di Sanita, Rome (Italy). Lab. delle Radizioni.

SPECTROPHOTOMETRIC STUDIES ON THE RNA STRUCTURE IN E.COLI RIBOSOMES. PART 1: FUNDAMENTALS

OF ULTRAVIOLET SPECTROPHOTOMETRY OF NUCLEI ACIDS

M. Belli, F. Mazzei, and G. Onori (Perugia Univ., Italy) 20 Mar. 1980 35 p refs In ITALIAN; ENGLISH summary 2 Vol. (ISS-R-80/2-Pt-1; ISSN-0390-6477) Avail: NTIS HC A03/MF A01

The fundamentals of UV absorption spectroscopy of nucleic acids are reviewed. The relationship between the absorption of a polymer (DNA, RNA) with the absorption properties of the bases, is described. The association between spectral changes and structural modifications in nucleic acids, is also evidentiated. M.G.

N82-15735# Istituto Superiore di Sanita, Rome (Italy). Lab. delle Radiazioni.

SPECTROPHOTOMETRIC STUDIES OF THE RNA STRUCTURE IN E.COLI RIBOSOMES. PART 2: INFLUENCE OF IONS AND PROTEINS ON THE RNA SECONDARY STRUCTURE

A. Araco, M. Belli, F. Mazzei (Perugia Univ.), and G. Onori 27 Mar. 1980 31 p refs In ITALIAN; ENGLISH summary 2 Vol. (ISS-R-80/3-Pt-2; ISSN-0390-6477) Avail: NTIS HC A03/MF A01

The main results obtained on E.coli ribosomes and rRNA conformation are reviewed. It is shown in particular that the rRNA structure within the ribosome subunits can be affected by the interaction with proteins and with magnesium. M.G.

N82-15736# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

FUNDAMENTALS OF AERONAUTICAL AND AEROSPACE MEDICAL SCIENCE

Cai Qiao, Feng Genquan, and Yan Yuanfu 17 Jul. 1981 956 p Transl. into ENGLISH of the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 344 p (AD-A102298; FTD-ID(RS)T-1802-80) Avail: NTIS HC A99/MF A01 CSCL 06/5

The biological and physiological effects of flight environments were examined along with the types of environments themselves. The environments discussed are of three major types: the external environment, the cabin environment, and the internal environment of the body. Emphasis is placed on acceleration stresses and high gravity environments, flight safety and health, and the human body's reaction to the particular stresses discussed.

N82-15737# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE DEVELOPMENTAL HISTORY OF AERONAUTICAL AND AEROSPACE MEDICAL SCIENCE

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 4-8 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

Early research is emphasized. Several experiments in balloon flight and pressurized cabins are discussed. Problems arising from aeronautical development in World War 1 such as frostbite, hypoxia, decompression sickness, and flight fatigue are discussed. The influences of space navigational development on aerospace medicine are also discussed. The relationship between aircraft flight environment and spacecraft environment is considered. T.M.

N82-15738# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ENVIRONMENTAL CONDITIONS OF AVIATION AND SPACE NAVIGATION

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 9-24 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

Three types of environments are discussed: the space environment, the inner cabin environment, and the environment in the human body. Atmospheric conditions encountered in aviation and space flight were reviewed. Medically related aircraft and spacecraft environmental conditions are summarized and include low pressure, lack of oxygen, decompression, explosive decompression, and oxygen poisoning. T.M.

N82-15739# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

GENERAL LAWS OF AVIATION AND SPACE NAVIGATION ENVIRONMENTAL EFFECTS ON THE HUMAN BODY

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 25-34 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

The effects of environmental conditions on the human body are brought about within various complex relations. The so-called action of a single condition is only the most outstanding manifestation in a certain dynamic process. The physiological changes and pathological process of the human body in space navigation as well as their reasons and reaction mechanisms were analyzed. The following factors are discussed: the qualities and composition of the environmental factors; the functioning state of the organism at the time; and man's subjective dynamic role. T.M.

N82-15740# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

MEDICAL PROBLEMS OF GRAVITATIONAL CHANGES AND POWERED FLIGHT

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 35-37 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

Three types of gravitational change are discussed: overweightness, angular acceleration, and noise produced by air vibration. Overweightness is considered as a large increase in the gravitational force such as impact. The vestibule-autonomic nervous system reactions and motion sickness caused by angular acceleration are covered. Aerodynamic noise tolerances are discussed. T.M.

N82-15741# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

INJURY AND PROTECTION OF OVERWEIGHTNESS

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 38-129 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

Physiological acceleration and acceleration stresses are summarized. Acceleration protection in high gravity environments is emphasized. The physics of angular acceleration and impact acceleration were reviewed. The physiological effects of high gravity are presented in detail along with pilot performance results due to such stresses. T.M.

N82-15742# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

HARMFULNESS OF VIOLENT IMPACT AND AIRFLOW SHOCKS

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 131-162 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

Various types of impact on the human body resulting from aircraft accidents or sudden deceleration are discussed. Special emphasis is given to parachuting or ejection from the aircraft and protective measures to be taken. L.F.M.

N82-15743# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
HUMAN BODY REACTION TO VIBRATION
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-08) 17 Jul. 1981 p 163 223 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

Low frequency whole body vibrations sustained in aircraft and spacecraft are discussed. The physiological effects of such vibrations and protective measures to be taken are presented.
L.F.M.

N82-15744# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE EFFECTS OF ROTATION AND OSCILLATION: AERIAL SICKNESS
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 195-223 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

Aerial sickness caused by aircraft and spacecraft motion is discussed. Various motion sickness drugs and other measures for combating this sickness are presented. L.F.M.

N82-15745# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
FLIGHT ILLUSIONS
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 224-295 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

Flight illusions encountered by aircraft pilots are discussed. Pilot selection and training techniques as well as other measures for preventing and overcoming these illusions are presented.
L.F.M.

N82-15746# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
MAN'S ADAPTATION TO WEIGHTLESSNESS AND LOW WEIGHT
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ED(RS)T-1802-80) 17 Jul. 1981 p 244-295 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

Weightlessness and its effect on astronauts after long exposure to it are discussed. Its causes and various means to combat it are presented. L.F.M.

N82-15747# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
NOISE AND SENSE OF HEARING
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 296-335 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

Aircraft noise and its effect on pilots and others of the crew are discussed. Noise reduction techniques and steps to be taken to allow pilot efficiency in a noisy environment are presented. L.F.M.

N82-15748# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE PHYSIOLOGICAL EFFECT OF LOW-AIR-PRESSURE ANOXIA
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 337-398 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

Anoxia, a problem of the atmospheric environment in aerospace medicine, is discussed extensively. Discussion is limited to the physiological effects of anoxia caused by low air pressure. More specifically, the effects on the human respiratory, circulatory, nervous, and metabolic systems are detailed. M.D.K.

N82-15749# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CAISSON DISEASE
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 398-426 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

The causal factors of Caisson Disease, a problem of the atmospheric environment in aerospace medicine, are discussed. Physiological effects of the disease on the human respiratory, circulatory, digestive, and skeletal systems are considered. Effects on body organs and tissues and attendant shock and fainting are also discussed. The physiological effects (mechanical and biochemical) of the formation of bubbles inside body tissues, the main cause of Caisson Disease, are detailed. Pressurization treatment and suggested procedures for adaptation and training as preventative measures are also discussed. M.D.K.

N82-15750# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
DANGERS OF EXPLOSIVE DECOMPRESSION
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 427-439 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

Explosive decompression, drastic decompression at an ascent rate of over 1.5 km/sec, in space ships is either caused by structural damage or collision with a large meteor. The physiological effects of explosive decompression, a problem of the atmospheric environment in aerospace medicine, are discussed. Specific effects on the physiological tolerances of the human respiratory (bubble formation), digestive, nervous, and circulatory systems and attendant effects on body organs are considered. Suggestions for developing adaptation, training, and preventative methodology to handle explosive decompression are given.
M.D.K.

N82-15751# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
OXYGEN TOXICATION
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) p 440-456 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

Oxygen poisoning, oxygen toxication, will be induced if the oxygen partial pressure is over 176 mm Hg and the duration is too long. The physiological effects of oxygen poisoning, a problem of the atmospheric environment in aerospace medicine, is discussed. Effects on the human respiratory and circulatory systems, hearing and vision, and body tissues are considered. Suggestions for fire prevention, safety measures, and protective equipment for use in pure oxygen environments are given.
M.D.K.

N82-15752# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE RELATIONSHIP OF BODY TEMPERATURE TO ENVIRONMENTAL TEMPERATURE
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 457-476 Transl.

into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

The unresolved problem of fluctuations in environmental temperature in aeronautics and space travel and the attendant physiological effects on the human body are considered. Environmental temperature requirements, namely optimal and tolerable temperatures, the damage done to the human body by cold and heat, and its prevention are discussed. The human body's inherent mechanisms and their responses in regulating normal body temperature are also reviewed. M.D.K.

N82-15753# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

COMFORTABLE TEMPERATURE AND TOLERABLE TEMPERATURE

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 477-506 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

The range of temperature during flight which makes people feel comfortable was examined. During passenger flights or space travel, the cabin temperature is kept in a range comfortable for the crew and passengers. However, this comfortable temperature range cannot always be maintained. Flighters always have to sacrifice comfort for speed, any complicated temperature regulation facilities adds extra weight and volume to the plane, and slow it down. The comfortable temperature range required to maintain flying ability and operational efficiency is the acceptable temperature. The comfortable, tolerable and acceptable temperatures are discussed. E.A.K.

N82-15754# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE PHYSIOLOGICAL EFFECT OF HEAT AND ITS PREVENTION

In its Fundamentals of Aeron. and Aerospace Med Sci. (FTD-ID (RS)T-1802-80) 17 Jul. 1981 p 507-534 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

The actual physiological effects of heat and preventive measures are discussed. The following issues are examined: (1) change of skin temperature and internal body temperature; (2) perspiration rate; (3) change of cardiovascular systems, respiration, and metabolism; (4) effects of heat; (5) sensitivity to temperature; (6) heat stroke; (7) heat adaptation; (8) heat damage prevention. E.A.K.

N82-15755# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE EFFECT OF COLD AND THE COLD PREVENTION

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 535-554 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

The effects of cold, and cold prevention are described. Physiological responses to low temperatures are outlined: (1) physiological effects and damaged of cold; (2) local frostbites and injuries caused by cold; (3) effects of cold on flying ability; (4) factors affecting physiological responses to cold; (5) adaptation to cold; (6) clothing. E.A.K.

N82-15756# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

IONIZING RADIATION AND ITS BIOLOGICAL EFFECTS

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 555-630 Transl. into ENGLISH from "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

The biological effects of ionizing radiation are outlined. The following issues are discussed: (1) units of ionizing radiation; (2) radiation environments in space travel (solar cosmic radiation, terrestrial radiation zones); (3) radiation intensity during air and space travel (cosmic radiation in supersonic jets); (4) mechanism of radiation biological effects; (5) biological target theory; (6) radiation damage; (7) limitations of radiation safety. E.A.K.

N82-15757# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

OTHER BIOLOGICAL EFFECTS OF RADIATION

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 631-707 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

The application of lasers in aerospace technology, its biological effects, and protective measures are discussed. The light simulated radiation has special characteristics of collimation and coherency, and its light pressure and destructive power is much greater than common light. Various types of lasers are solid gas, chemical, semiconductor and their light waves which have several thousand different wavelengths from ultraviolet to infrared. The use of laser technology in industrial health, and scientific research, and its use in military affairs and national defense is outlined. In the military, lasers have not only become effective measures in communications, aiming, reconnaissance, observations, night vision and navigation, but they can also be used directly as deadly weapons. E.A.K.

N82-15758# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

VISUAL PROBLEMS IN AVIATION AND SPACE NAVIGATION

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) p 708-739 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

Visual problems encountered on aerospace navigation are discussed. Vision depends on the stimulation of visible light for realization and visible light is a type of electromagnetic radiation. The wavelength of visible light is 3,800-7,500 angstrom and photon energy lies in the range of 3.1-16.5 electron volts. After entering a high altitude or outer space, many differences occur between the visual environment and the Earth's surface, presenting aerospace medical science with many special problems concerning vision. E.A.K.

N82-15759# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

SPACE NAVIGATION LIFE GUARANTEES

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 740-822 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

Requirements for and the provision of a normal living environment and the necessary supplies of food, water, gases, and hygenic and medical safequards during space flight are discussed. The human metabolism is reviewed. Food supply and preparation methods, oxygen supply and methods of handling waste gases, the water supply and water regeneration, closed life support systems and subsystems and environmental sanitation are described. Space suit and helmet design are considered. Medical treatment and first aid, the medical experiences of the Apollo astronauts, and emergency requirements for forced landing on Earth in desert, ocean, and polar regions and the basic survival kit are discussed. The biological clock and diurnal rhythm are considered. J.D.H.

N82-15760# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

CABIN POLLUTION

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 822-873 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

Possible pollutants existing in closed aircraft and spacecraft cabins and methods for the handling and disposal of these pollutants are described. Pollutants from fuel, waste gases, and rubber articles are considered. Excretions from the human body including gases, perspiration, feces, urine, and gastrointestinal tract gases are also sources of pollution. Pollutants originating from high altitudes and outer space, such as high altitude ozone and cosmic space radiation, are considered. J.D.H.

N82-15761# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

AVIATION MEDICAL GUARANTEES

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 874-889 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

The medical requirements for pilots and air crew and how to guarantee their safety, work capabilities, and physical health in the air are discussed. The various characteristics of flight work are described. Psychological and physical preparation of air crews for flight stress are considered. J.D.H.

N82-15762# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

SPACE NAVIGATION MEDICAL GUARANTEES AND MEDICAL SUPERVISION

In its Fundamental of Aeron. and Aerospace Med. Sci. (FTD-ID(RS) T-1802-80) 17 Jul. 1981 p 890-919 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979

Avail: NTIS HC A99/MF A01 CSCL 06/5

The medical requirements for astronauts and how to quarantee their safety, work capabilities, and physical health during space flight are discussed. The characteristics of flight work are described. Psychological and physical preparation of astronauts for flight stress are considered. Special consideration is given to the medical selection of astronauts and the medical guarantees and supervision required during training, and prior to, during, and after space flight. J.D.H.

N82-15763# Joint Publications Research Service, Arlington, Va.

USSR REPORT: LIFE SCIENCES BIOMEDICAL AND BEHAVIORAL SCIENCES, NO. 13

10 Dec. 1981 89 p refs Transl. into ENGLISH from various Russian articles

(JPRS-79639) Copyright. Avail: Issuing Activity

The fouling of metals and petroleum products by anaerobes, the production of synthetic proteins from biomass, the development of virus-resistant varieties of plants, and general epidemiology and prophylaxis for infectious diseases are among the topics covered in this review of progress studied in the areas of biochemistry, medical science, radiation biology, and ecosystems.

N82-15765# Joint Publications Research Service, Arlington, Va.

ALL-UNION CONFERENCE ON NEW SOURCES OF FOOD PROTEIN AND THEIR APPLICATION

L. A. Zakordonets *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 13 (JPRS-79639) 10 Dec. 1981 p 10-12 Transl. into ENGLISH from Mikrobiol. Zh. (Kiev), v. 43, no. 2, Mar. - Apr. 1981 p 266-267 Conf. held in Tbilisi, USSR, Nov. 1980

Avail: Issuing Activity

Highlights are given of reports presented on general questions concerning the processing of protein, obtaining protein from animal and plant sources, using protein from new sources derived from meat products, dairy products, bread-making and the canning industry. A.R.H.

N82-15766# Joint Publications Research Service, Arlington, Va.

ECOLOGICAL AND TECHNOLOGICAL PROBLEM OF BIODAMAGES

I. A. Kozlova and E. Z. Koval *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 13 (JPRS-79639) 10 Dec. 1981 p 13-15 Transl. into ENGLISH from Mikrobiol. Zh. (Kiev), v. 43, no. 2, Mar. - Apr. 1981 p 267-268

Avail: Issuing Activity

The problem of biodamages is the ecological-technical problem of modern times, encompassing a wide circle of questions related to the study of organism-destruction from microorganisms, rodents and birds which cause damage to an enormous number of materials, resources, products and equipment and the need to develop means for protection from bioovergrowth, biodamage and biocorrosion. Topics discussed in 15 scientific reports on new directions in research on this global problem are summarized. A.R.H.

N82-15767# Joint Publications Research Service, Arlington, Va.

CONFERENCE ON PLANT VIROLOGY

V. G. Krayev *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 13 (JPRS-79639) 10 Dec. 1981 p 16-18 Transl. into ENGLISH from Mikrobiol. Zh. (Kiev), v. 43, no. 2, Mar. - Apr. 1981 p 269-270

Avail: Issuing Activity

The basic diseases affecting agricultural ornamental plants in Poland and efforts to identify new viruses and produce resistant varieties of farm crops were reviewed in a conference attended by 70 scientists from 7 countries. Other topics discussed include: (1) the influence of viral diseases of plants and animals on food products and the productivity of livestock; (2) methods for diagnosing viral diseases and their comparative effectiveness; (3) characteristics of new viruses, strains, and isolates of plant viruses in various countries and their distribution in the seeding of cultured plants such as alfalfa, potatoes, peanuts, tomatoes, cucumbers, tabacco, and raspberries; (4) the epidemiology of viral diseases and practical means of combatting them; and (5) advances in photovirology. A.R.H.

N82-15769*# Research Triangle Inst., Research Triangle Park, N. C.

APPLICATIONS OF AEROSPACE TECHNOLOGY IN BIOLOGY AND MEDICINE

H. C. Beall, R. L. Beadles, J. N. Brown, Jr., W. H. Clingman, M. W. Courtney, D. J. Rouse, and R. W. Scearce, Jr. Hampton, Va. NASA Jul. 1979 128 p refs

(Contract NAS1-14708)

(NASA-CR-159106; RTI/1411/00-05F) Avail: NTIS HC A07/MF A01 CSCL 06B

Medical products utilizing and incorporating aerospace technology were studied. A bipolar donor-recipient model for medical transfer is presented. The model is designed to: (1) identify medical problems and aerospace technology which constitute opportunities for successful medical products; (2) obtain early participation of industry in the transfer process; and (3) obtain acceptance by medical community of new medical products based on aerospace technology. E.A.K.

N82-15770*# Wisconsin Univ. - Madison.

NASA BIOMEDICAL APPLICATIONS TEAM ADVISORY CENTER FOR MEDICAL TECHNOLOGY AND SYSTEMS

Final Report

Melvin P. Siedband 28 May 1981 29 p refs

(Contract NAS5-26454)

(NASA-CR-166755) Avail: NTIS HC A03/MF A01 CSCL 06B

Projects carried out by the UW-BATeam are reported. The following subjects were investigated: clinical opthalmic ultrasound improvements, magnetic cell sorters, hyperthermia treatment for cancer, joystick driving control for the handicapped, qualitative coronary artery imaging (MIPS), and speech autocuers. E.A.K.

N82-15771# Naval Ocean Systems Center, San Diego, Calif. Bioengineering Branch.

REMOTE MEDICAL DIAGNOSIS SYSTEM (RMDS) UTILIZATION STUDY Technical Progress Report, Dec. 1980 - May 1981

I. Stevens and C. Zekan (WESTEC Services, Inc.) 18 Aug. 1981 44 p refs

(Contract N00123-81-D-0353)

(AD-A105559; NOSC-TR-700) Avail: NTIS HC A03/MF A01 CSCL 06/5

Remote medical diagnosis systems are being successfully utilized for consultation in rural health care programs and private radiology practices. Consultation over RMDS-type systems reduces medical referrals and evaluations and assists in making triage decisions with a greater degree of confidence. RMDS-type systems can be used effectively for teleradiology consultations. The utilization of RMDS on ships and at remote shore sites has the potential for improved diagnoses. Nonphysician health care providers are more inclined to use telemedicine than physicians. GRA

N82-15772# Brookhaven National Lab., Upton, N. Y. Medical Research Center.

APPLICATIONS OF NUCLEAR TECHNIQUES FOR IN VIVO BODY COMPOSITION STUDIES AT BROOKHAVEN NATIONAL LABORATORY

S. H. Cohn, K. J. Ellis, D. Vartsky, A. N. Vaswani, and L. Wielopolski 1981 42 p refs Presented at the IAEA Conf. on Nucl. Based Tech. for In Vivo Study of Human Body Composition, Upton, N.Y., 22 Jun. 1981

(Contract DE-AC02-76CH-00016)

(DE81-029922; BNL-29959; CONF-8106151-1) Avail: NTIS HC A03/MF A01

A series of technical developments and their clinical application in various nuclear technologies is described. These include the development of a portable neutron activation facility for measuring cadmium in vivo in kidney and liver, a technique for the measurement of body iron utilizing nuclear resonant scattering of gamma rays, a noninvasive measure of the skeletal levels of lead by an X-ray fluorescence technique, and the development of a pulsed Van de Graaff generator as a source of pulsed neutrons for the measurement of lung silicon. DOE

N82-15773# Massachusetts Inst. of Tech., Cambridge.

MYOCARDIAL PERFUSION SCINTIGRAPHY USING A NEW TECHNIQUE, THE MESH CHAMBER Progress Report, 1 Sep. 1978 - 1 May 1981

Louis S. Osborne and B. Leonard Holman Aug. 1981 16 p Prepared in cooperation with Harvard Medical School

(Contract DE-AS02-78EV-04969)

(DE81-027995; DOE/EV-04969/3) Avail: NTIS HC A02/MF A01

Myocardial perfusion scintigraphy performed after the injection of a potassium analogue during exercise to detect transiently ischemic myocardium due to coronary artery disease was examined. The limitation in the implementation of the technique for the screening of patients with coronary artery disease is the lack of a high resolution, positron detecting system. The positron multiwire proportional counter solves this problem. The dispersion of the absorbing material is achieved by stringing wires of high Z material, such as tungsten, in a cross pattern. The wire layers are at graded voltages, the ionization from the photoelectrons is drifted through the stack and picked up by sense wires operating *in the proportional mode. Positron annihilation detectors are self* collimating. The acquisition of events over a multiplicity of angles allows 3 dimensional reconstruction. The combination of large solid angle, high efficiency and a short source half life minimizes radiation dose to the patient. DOE

N82-15774# Pacific Northwest Lab., Richland, Wash.

PROBLEMS IN EVALUATING HEALTH EFFECTS OF OCCUPATIONAL AND ENVIRONMENTAL EXPOSURES

Ethel S. Gilbert 1981 23 p refs Presented at the Conf. on Statistical and Epidemiological Methods in Ionizing Radiation, Berkeley Springs, W. Va., 6-10 Jul. 1981

(Contract DE-AC06-76RL-01830)

(DE81-028440; PNL-SA-9632; CONF-810755-1) Avail: NTIS HC A02/MF A01

The problems involved in analyzing and interpreting radiation exposure data are addressed. Existing standards for exposure are based primarily on estimates of health effects obtained by extrapolation from effects of high level exposures. Occupational and environmental exposures provide one source of data. Populations exposed in this manner were studied. Because of the size of most of the groups and the magnitude of the exposures received the amount that can be learned from such populations is severely limited. Many of these problems are illustrated by study of the effects on mortality of occupational exposure to radiation at the Hanford plant. DOE

N82-15775# Bureau of Radiological Health, Rockville, Md. Div. of Electronic Products.

AIRBORNE ULTRASOUND: MEASUREMENT AND POSSIBLE ADVERSE EFFECTS

Bruce A. Herman and David Powell May 1981 19 p refs Prepared in cooperation with Rensselaer Polytechnic Inst., Troy, N.Y.

(PB81-240459; DHHS/PUB/FDA-81-8163) Avail: NTIS MF A01; SOD HC CSCL 06R

Ultrasound energy in the range of 16 kHz to 100 kHz which is used in a variety of consumer and industrial applications is discussed. For consumer devices the intended transmitting medium is usually air while industrial processes usually use liquid or solid materials as propagating media. In the latter situation attendant acoustic energy is radiated into the surrounding *atmosphere.* GRA

N82-15776# Colorado Univ., Denver. Health Sciences Center.

NON-INVASIVE PULMONARY ARTERIAL PRESSURE MEASUREMENT Final Report, 1 Jun. 1976 - 30 Nov. 1980

John T. Reeves 8 Jun. 1981 124 p

(Contract NO1-HR-6-2920)

(PB81-239410; NIH-NO1-HR-62920-1F) Avail: NTIS HC A06/MF A01 CSCL 06P

Pulmonary arterial pressure by noninvasive means based on measurement of hemodynamic variables, particularly pulse wave velocity, instantaneous blood flow and pulmonary arterial diameter was measured. An esophageal approach showed good pulmonary arterial flow patterns from the esophagus. A dual range gated Doppler from the front obtained Doppler flow pulses in the main pulmonary artery. A body plethysmographic technique recorded flow at the most distal part of the pulmonary vascular bed, the microcirculation. In humans undergoing right heart catheterization, pulse wave velocity was an excellent correlation of pressure in the low range. It is suggested that the scator at higher pressures is due to variations in artery diameter and wall stiffness. It is concluded that a hemodynamic approach is feasible using known techniques if the problem of measuring pulse wave velocity can be solved. GRA

N82-15777# National Bureau of Standards, Washington, D.C. National Engineering Lab.

A HEAT TRANSFER ANALYSIS OF SCALD INJURY Final Report

Robert L. Palla, Jr. Jul. 1981 69 p refs

(PB81-238503; NBSIR-81-2320) Avail: NTIS HC A04/MF A01 CSCL 06E

Numerical solutions for skin tissues temperature during scald injury events are obtained and utilized in conjunction with a thermal injury criterion, to predict critical exposure levels for various heated fluids. A one dimensional tissue model of the *type used by Love is employed to determine the initial tissue* temperature distribution. The bio-heat equation for tissue heat transfer is then solved via an implicit finite difference technique, subject to convective heating and cooling at the surface. The sensitivity of the critical exposure level to variation in tissue properties and convective heating coefficients is investigated. Thermal injury thresholds are presented for various fluids along with bounds to reflect uncertainty in assumed tissue properties. The results obtained are in good agreement with existing experimental scald injury data. GRA

N82-15778# National Inst. on Drug Abuse, Rockville, Md. Div. of Research.

NEW APPROACHES TO TREATMENT OF CHRONIC PAIN: A REVIEW OF MULTIDISCIPLINARY PAIN CLINICS AND PAIN CENTERS

Lorenz K. Y. Ng, ed. May 1981 212 p refs Presented at a Conf. held at Bethesda, Md., 20-21 Jun. 1980

(Contract NIDA-271-79-3607)

(PB81-240913; DHHS/PUB/ADM-81-1089; NIDA/DR081-03;

LC-81-600060; NIDA/RM-36) Avail: NTIS HC A10/MF A01 CSCL 06E

Chronic pain treatment is discussed including multidisciplinary pain clinics and centers and their staffing and organization, the problems for which patients are treated, drugs taken by entering patients, therapeutic approaches used, costs of treatment, and methods for long-term evaluation of treatment effectiveness. Goals for future research and professional and public education are also presented. GRA

N82-15779# Assessment Systems Corp., St. Paul, Minn.
METHODS FOR LINKING ITEM PARAMETERS Final Report
C. David Vale, Vincent A. Maurelli, Kathleen A. Gialluca, David J. Weiss, and Malcolm James Ree Brooks AFB, Tex. AFHRL Aug. 1981 190 p refs
(Contract F33615-80-C-0008)
(AD-A105509; AFHRL-TR-81-10) Avail: NTIS HC A09/MF A01 CSCL 05/9

A simulation study to determine appropriate linking methods for adaptive testing items was designed. Responses of examinees of three group sizes for four test lengths were simulated. Three basic data sets were created: (a) randomly sampled data set, (b) systematically sampled data set, and (c) selected data set. Three categories of evaluative criteria were used: fidelity of parameter estimation, asymptotic ability estimates, root-mean-square error of estimates, and the correlation between true and estimated ability. Test length appeared to be relatively more important to calibration effectiveness than was sample size, efficiency analyses suggested that increases in test length were at least three to four times as effective in improving calibration efficiency as proportionate increases in calibration sample sizes. The asymptotic ability analyses suggested that the linking procedures based on Bayesian ability estimation (an equivalent-groups procedure) were somewhat more effective than the others and that the equivalent-tests method was typically no better than not linking at all. Analyses using the relative efficiency criteria suggested that the equivalent-groups procedures were superior to the equivalent-tests procedures and that those using Bayesian scoring procedures were slightly superior to the others tested. Efficiency loss due to linking error was always less than that due to item calibration error and although test length and sample size had a definite effect on calibration efficiency, no strong effects appear with respect to linking efficiency. For the systematically sampled data set, the anchor-test and anchor-group methods were considered along with the equivalence methods. GRA

N82-15780*# Life Systems, Inc., Cleveland, Ohio.
PREPROTOTYPE NITROGEN SUPPLY SUBSYSTEM DEVELOPMENT Interim Report, Jun. 1981
D. B. Heppner, T. M. Hallick, and F. H. Schubert Jun. 1981 50 p refs
(Contract NAS2-10673)
(NASA-CR-166192; LSI-TR-410-4) Avail: NTIS HC A03/MF A01 CSCL 06K

A nitrogen supply subsystem based on the dissociation of hydrazine into a mixture of hydrogen and nitrogen is developed. The latter is separated to provide makeup nitrogen to control the composition of spacecraft atmospheres. Specific hardware developments resulted in the design and fabrication of a nominal 3.6 kg/d nitrogen generation module. The design integrates a hydrazine catalytic dissociator, three ammonia dissociation stages and four hydrogen separation stages into a 33 kg, 14 cu dm module. A technique was devised to alternate the ammonia dissociation and hydrogen separation stages to give high nitrogen purity in the end product stream. Tests show the product stream to contain less than 0.5 percent hydrogen and 10 parts per million ammonia. The design and development of a test stand for the nitrogen generation module and a series of tests which verified its operation and performance capability are described. S.L.

N82-15781# Luitpoldhuette A.G., Amberg (West Germany).
HUMANIZATION OF WORKING PLACES IN THE FOUNDRY BY USE OF AN AUTOMATIC FETTLING EQUIPMENT Final Report
Hanns Helge Bolle Bonn Bundesministerium fuer Forschung und Technologie Feb. 1981 64 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-HA-81-004; ISSN-0171-7618) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 13,40

Operation of a pilot plant using an industrial robot in the fettling shop of a foundry is described. A continuous path 5 axis robot was employed to steer the pneumatic grinding equipment while the castings remained in a fixed position. Satisfactory removal of edges from the castings was achieved. Ergonomic analysis revealed a reduction of stress for human workers in the foundry. Problems encountered require an automatic change of tools and investigation of the wear of abrasives. J.D.H.

N82-15782# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
A CRITERION FOR THE DISPOSAL OF M58 SLEEPING BAGS
W. A. Lotens and E. J. M. Smienk 1979 23 p refs In DUTCH; ENGLISH summary
(Contract A77/KL/156)
(IZF-1979-15; TDCK-73398) Avail: NTIS HC A02/MF A01

In order to separate sufficiently insulating from non-sufficiently insulating sleeping bags, a convenient criterion was developed. Physical measurements showed that the thickness of the material under a pressure of 15 N/sq m gives a good correlation with insulating power. By means of a heat conduction model of a man in a bag (based on experiments with subjects) a relation between minimum tolerable outside temperature and thickness of the bag was established. It turns out that with optimal use of all personal equipment a new sleeping bag (26 mm thickness) will fail to keep a man warm in 3% of the man-nights and an old one (12 mm thickness) in 6%. It is recommended to dispose of bags with a thickness less than 20 mm. This result, however, is highly dependent on the insulative suit that is worn. M.G.

N82-15783# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
HEARING PROTECTION
G. F. Smoorenburg, A. M. Mimpen, and H. A. vanLeeuwen 1980 17 p refs In DUTCH; ENGLISH summary
(Contract A76/K/104)
(IZF-1980-2; TDCK-73415) Avail: NTIS HC A02/MF A01

The acoustic attenuation of 20 types of ear plugs and 20 types of ear muffs was surveyed. Important design aspects, the maximum attenuation possible closing the ear canal, the attenuation of plug plus muff, and measuring methods are discussed. To determine the attenuation for practical purposes, differences in hearing protector fitting, temporary removal of protectors, and the noise spectrum must be considered. The effect of wearing hearing protectors on speech intelligibility is discussed. Speech intelligibility does not decrease for people with normal hearing exposed to steady state noise but it may decrease in relatively silent periods of fluctuating or intermittant noise and for all noises if one has a perceptive hearing loss. Author

N82-15784# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
EVALUATION OF CHEMICAL PROTECTIVE FACELETS AND COMPARISON OF FOUR PROTOTPYES
W. A. Lotens 1980 21 p In DUTCH; ENGLISH summary
(Contract A79/KL/111)
(IZF-1980-15; TDCK-75013) Avail: NTIS HC A02/MF A01

In a controlled field experiment four prototypes of chemical protective facelets were tested to determine the effect on physical and mental performance, and the chemical protection and ergonomic properties. Wearing facelets decreases the physical performance on running 400 m resp. 3 km by 3.5 resp. 7.5 percent. When worn during 24 hr. physical performace is variable and mental performance decreases by ca. 10 percent. There is no indication for adaptation within a one-week period. Chemical protection is sufficient for all four types after a while of wearing, however, one of four is highly sensitive for rain. Ergonomic tests show only slight differences between the facelets but there is a marked difference in comfort. Because of this the subjects preferred two types above the other two. Protection during sleep is far from optimal. Author

N82-15785# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
THE LINK-MILES DRIVER TRAINING SIMULATOR FOR

TRACKED VEHICLES: INFLUENCE OF CABIN MOTION ON GEAR-CHANGE LEARNING
K. J. Poll 1980 15 p refs In DUTCH; ENGLISH summary (Contract A76/KL/148)
(IZF-1980-24; TDCK-75017) Avail: NTIS HC A02/MF A01

The influence of the moving base from the Leopard driving simulator on gear-change learning was studied. Twelve trainees were trained with motion and twelve others without motion. All trainees were constantly accompanied by the instructor and after the training on the simulator, all trained on the tank. No differences between both groups were found in learning time on the simulator and in learning time on the tank. This means that the information, given by the motion, can be replaced by good instruction.
Author

N82-15786# Sandia Labs., Albuquerque, N. Mex.
SIMULATOR DATA ON HUMAN ERROR PROBABILITIES
E. J. Kozinsky (General Physics Corp.) and H. E. Guttmann 1981 7 p refs Presented at the ANS/ENS Topical Meeting on Probabilistic Risk Assessment, Port Chester, N.Y., 20 Sep. 1981 (Contract DE-AC04-76DP-00789)
(DE81-026094; SAND-81-1707C; CONF-810905-4) Avail: NTIS HC A02/MF A01

Analysis of operator errors on NPP simulators was used to determine human error probabilities (HEP). Simulator data tapes are analyzed for operator error rates. The tapes collected, using performance measurement system software, contain a history of all operator manipulations during simulated casualties. Analysis yields a time history or operational sequence diagram and a manipulation summary, both stored in computer data files. Data searches yield information on operator errors of omission and commission. This work experimentally determined HEP's for probabilistic risk assessment calculations. DOE

N82-15787# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bonn (West Germany). Inst. fuer Flugmedizin.
USE OF A TELEVISION MULTIPOINT x-y TRACKER FOR DETERMINING THE TRANSMISSION OF VIBRATIONS ON HUMAN BEINGS [UEBER DIE ANWENDUNG EINES 'TV-MULTIPOINT x-y TRACKERS' ZUR BESTIMMUNG DER SCHWINGUNGSUEBERTRAGUNG AUF DEN MENSCHEN]
L. Vogt and E. Schwartz 1980 10 p In GERMAN
Avail: NTIS HC A02/MF A01

A television multipoint x-y tracker was used to study the influence of mechanical vibrations on the human body, in a project on human factors in man machine systems. A mechanical model of a human being seated on a shaker was employed on which the mechanical impedance and the vibration transmission (transmissibility) were investigated as a function of vibration frequency. The multipoint x-y tracker provides contactless registration of the motions of the head. The system is based on a television camera, and allows the simultaneous and continuous registration of the x and y coordinates of three points of a moving object. Author (ESA)

N82-15788# Rexnord, Inc., Milwaukee, Wis. Environmental Research Center.
EVALUATION OF AIR CLEANING AND MONITORING EQUIPMENT USED IN RECIRCULATION SYSTEMS
Mark L. Holcomb and Robert C. Scholz Apr. 1981 200 p refs
(Contract PHS-NIOSH-210-78-0011)
(PB81-242695; DHHS/PUB/NIOSH-81-113) Avail: NTIS HC A01; SOD HC CSCL 06J

Several pilot scale air cleaners and monitors were evaluated to determine their performance characteristics, maintenance requirements, and reliability for use in a recirculating exhaust system. A set of evaluation criteria for recirculation system components were developed. Then, selected system components (including an electrostatically augmented fabric filter, electrostatic precipitator, aspirated cartridge filter, four different extractive type particulate air monitors, three different extractive ozone monitors and a safety monitoring filter were installed and tested on a welding process exhaust. The results indicate that many factors must be evaluated before a decision can be reached concerning the use of a particular device. Additionally, components of a complete recirculation monitoring system were identified and the need for the development of commercial devices incorporating all of these components was evidenced by the fact that each of the commercially available devices tested lacked one or more of these components. GRA

N82-15789# National Inst. for Occupational Safety and Health, Cincinnati, Ohio. Div. of Physical Sciences and Engineering.
AN EVALUATION OF ENGINEERING CONTROL TECHNOLOGY FOR SPRAY PAINTING
Dennis M. OBrien and Donald E. Hurley Jun. 1981 185 p refs
(PB81-243123; DHHS/PUB/NIOSH-81-121) Avail: NTIS MF A01; HC SOD CSCL 06J

Field surveys of 11 finishing operations provided information for an evaluation of control technology for spray painting and coating processes. Studies were conducted in the automobile refinishing, wood and metal furniture, transportation equipment (nonautomotive), heavy machinery, and appliance finishing industries. Processes selected provide representative coverage of spray finishing operations relative to the number of exposed workers, different control techniques, physical size of the workpiece, and the coating systems that are typically used. Control of selected health hazards is discussed; available control options evaluated. Case study summaries include analysis of: hazards, engineering controls and work practices, ventilation measurements, air sampling data and personal protective equipment. Results should be usable as a reference source. GRA

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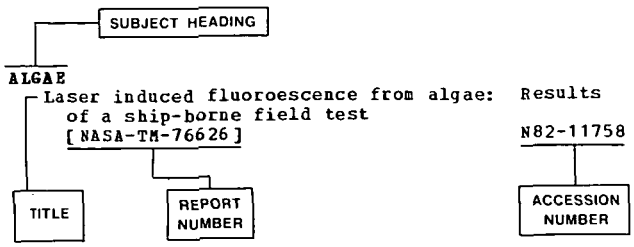

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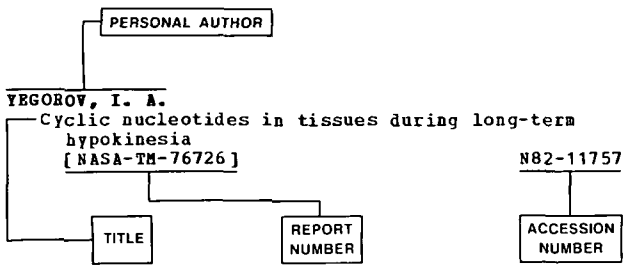

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